



KIMJONGILIA

—THE KING FLOWER HAS APPEARED
AND SPREAD ABROAD—

PYONGYANG, KOREA

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AND SPREAD ABROAD—**

**FOREIGN LANGUAGES PUBLISHING HOUSE
PYONGYANG, KOREA
JUCHE 87 (1998)**



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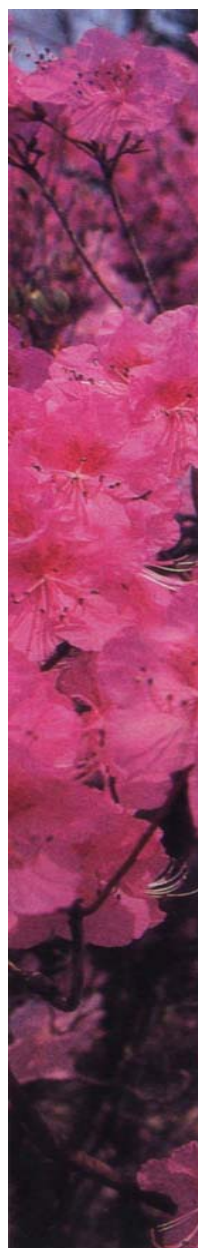


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THE KING FLOWER



– THE TREATISE AND LETTERS OF
DR. KAMO MOTOTERU WHO BRED A NEW FLOWER –

FLOWER BLOOMING IN THE HIGHLANDS

The Kimjongilia is a very large flower and sometimes exceeds 25 centimetres in diameter. It is a new variety of the tuberous begonia which puts forth glossy and crimson polypetalous flowers of lion-shaped flowering. I bred it in my flower garden in 1988, named it Kimjongilia and presented it to the dear General Kim Jong Il as a gift.

The tuberous begonia is a flowering plant which has been evolved through protracted and complicated crossbreeding of several pure breeds whose original home is the highlands of the Andes in South America like Bolivia and Peru. So, if it is grown in the places cool in summer and not very cold in winter and where the sun shines for more than 12 hours a day like on the highlands of the tropical regions, good flowers can be bloomed all the year round.

The original plants which were crossbred for Kimjongilia are *B. boliviensis*, *B. pearcei*, *B. cinnabarina*, *B. veitchii*, *B. rosaeiflora* and *B. davisii* growing wild on the highlands of the Andes Mountains which are the stock breeds of the tuberous begonia.

Research into the growing, propagation and breeding of Kimjongilia is now conducted by the Kimjongilia research room of the Central Botanical Garden at the foot of Mt. Taesong in the suburbs of Pyongyang. As many as several hundred thousand plants are propagated by tissue culture every year there. At present it is probably in the highest level in the world. Mass propagation of the tuberous begonia by tissue culture is not yet done in the United States nor in Europe.

At the International Flower Show held in Czechoslovakia in 1991 the Kimjongilia from Pyongyang won great admiration as never before and was awarded the gold medal for vivid colour, distinguished magnificence and unique style of display.

Korea first took part in the international flower show but her successful contribution to the promotion of international friendship and exchange was highly appreciated.

Kimjongilia plays a big role in the friendly foreign activity of Korea. Dear General Kim Jong Il has already sent the flowers as a gift to 47 countries in the world, which is evoking great admiration in these countries.

Exchange between me and the Central Botanical Garden of Pyongyang began when many plants were presented to President Kim Il Sung from Japan on the occasion of his 70th birthday.

Beginning with the International Flower Show held in Hamburg in 1963 I took part in the international flower shows held in Vienna, Paris and Montreal and each time I presented many plants to different countries. Therefore,

Characteristics of the Andes Species

division name of species	place of origin date of discovery	type of tuberous root	height of plant cm	size of leaf cm its shape	male flower			note
					size cm	shape	colour	
<i>B. cinnabarina</i>	Bolivia 1847	flat and round	20-30	length 15 width 19	5	round	brownish red	Basic original species 2n=26
<i>B. boliviensis</i>	Bolivia 1857	"	50-60	length 10 width 2-2.5 spindle-shaped	3-5	drooping bell-shaped	scarlet	Basic original species 2n=28
<i>B. pearcei</i>	Peru Bolivia 1864	domed	30-50	length 15 roundish pointed leaf	3	round elongated	yellow	connected with breeding of multiple flower 2n=26
<i>B. veitchii</i>	Peru Bolivia 1865		almost void of stalks	round	2.5-5	round	brownish red	Used as the parent plant for multiple flower 2n=28
<i>B. rosaeflora</i>	Peru 1866		"	roundish leaf with serrated rim	5-6	round	White-pink-red	Used for breeding white flower
<i>B. clarkei</i>	Peru		about 50	length 20	5-6	round	pink-red	
<i>B. davisii</i>	Peru 1876		almost void of stalks		<1.5	round	brown-light red	Used for breeding the species of multiple flowers

the flowers I sent are now growing in the RHS flower gardens in Wisray, the Yunnan Botanical Institute of China, the Moscow Central Botanical Garden of Russia and the Leningrad Botanical Garden. But no one puts great effort into growing the plants sent by Japan and makes efforts to disseminate them to other botanical gardens as the Central Botanical Garden in Pyongyang does.

In the course of this the exchange naturally deepened. Later 250 species of *Campanula punctata*, 100 species of lily and

KIMILSUNGIA

In April Juche 54 (1965) when the great leader President Kim Il Sung visited Indonesia, President Sukarno of Indonesia named the flower after the august name of President Kim Il Sung.

Growing this flower with great care, the Indonesian botanists completed its culture technique and presented the flower to President Kim Il Sung in Juche 64(1975).

The great leader Comrade Kim Jong Il sent the flower to the Central Botanical Garden and instructed that it should be widely propagated.

Kimilsungia is an ever-green perennial plant belonging to the *Orchidaceae* family.

It has hairy roots and several stalks come out from the neck of the root and grow to be 30-70 centimetres high. Its leaves are shaped like elongated willow leaves and adhere to the nodes alternately. One or two flower stalks come out from the tip of new shoots and bear 3-15 flowers which come out in succession and droop in the shape of a half moon. The flower has three petals and three calyxes and measures 6-8 centimetres. It is shaped like a butterfly. Its colour is deep pink. It is in bloom for 60-90 days.

Kimilsungia is a tropical plant and grows well when temperature stands at 25-30°C in the daytime and at 18-23°C at night, humidity is 70-80% and 15,000-30,000 luxes of sunshine is needed. Its roots grow spreading into moss and tree barks, not in soil.

Kimilsungia



lotuses were added and at last Kimjongilia came into being.

When I visited the Central Botanical Garden in Pyongyang over ten years ago, I saw Kimilsungia placed in front of a greenhouse there. This is the flower President Sukarno of Indonesia presented to President Kim Il Sung as a gift.

I asked the guide.

“As there is Kimilsungia, there must be Kimjongilia, too. Is that so?”

“Not yet.”

“Don’t you think it must be?”

“...”

Since then I was seized with the thought of what would be the flower worthy of being called Kimjongilia.

In my flower garden I bred *Iris ensata*, the tuberous begonia, *Iris*, lily and others but there was no new flower of independent high level which was worthy of being called Kimjongilia. I thought, it could be bred from the tuberous begonia.

The tuberous begonia deriving from pure breeds occurring on the highlands of the Andes has reached a high level in the course of being crossbred for one hundred and scores of

Dr. Kamo Mototeru



years as it is today, spreading over Europe, America and Japan.

It was thirty years ago when I first obtained the tuberous begonia from Reynolds, a Hungarian American, and Yoshie Seiro, a Japanese. The excellent flower I did not see so far aroused my admiration. But it did not endure the heat and withered in one or two years. Disappointed, I stopped growing the flower for a while. Later when I came to be acquainted with Rangdon of England, Hagman of Belgium and Anternery brothers of the United States, the world authorities of the tuberous begonia, I again made a fresh start.

I thought that Kimjongilia must be a very large flower of vigorous lion-form flowering before anything else. From olden times the Japanese people liked polypetalous flowers. Among them the flower of lion-form flowering which is unique to Japan was very much valued.

NATIONAL FLOWER OF KOREA—*MAGNOLIA SIEBOLDII*

The great leader President Kim Il Sung said that magnolia is beautiful like a peony, aromatic and its leaves are good to look at. So it is worth being boasted of in the world. He named this flower *mokran* in the sense that it is the flower coming out on the tree.



Magnolia sieboldii is the national flower of Korea.

It is a deciduous plant belonging to the family *Magnoliaceae*. The flowering plant is about 6-9 metres high and puts forth one white aromatic flower from the tip of the one-year old branch.

The flower measures 5-6 centimetres and has 6-9 petals and three calyxes.

It can stand cold and grows well even in the shade. It grows well in humid soil.

The lion-form flowering is evocative of the brave lion appearing in the masque dance *Stone Bridge*, a Japanese folk dance. The flower whose many distinct petals came out in many folds was to be mannish, magnificent and



Forms of flowers of the Andes species

1. *B. boliviensis* 3. *B. rosaeflora* 5. *B. pearcei*
 2. *B. veitchii* 4. *B. cinnabarina* 6. *B. davisi*

attractive.

I began to obtain the variety of lion-form flowering and at last reverentially presented the flower worthy of being called Kimjongilia to His Excellency General Kim Jong Il.

From then till spring this year I visited Korea nine times in all and the members of the Central Botanical Garden of Pyongyang stayed in my flower garden for six months in all, visiting it on three occasions as members of the delegation for exchange of horticultural technique and deepened technical exchange. The flower of the tuberous begonia is very large and excellent and requires sincere scientific study so much for its cultivation, dissemination and breeding, I suppose. It is only Japan and Korea

which bring begonias into bloom in such a big scale every year in the world.

I intend to broaden the ties of friendship by further promoting exchange and always leading in the van of the world.

January 30, 1995

Andes species

B. boliviensis



B. davisii



B. veitchii



B. pearcei



MY TUBEROUS BEGONIA

One of the pioneers who taught me floriculture is Mr. Yoshie Seiro who first studied and bred the tuberous begonia in Japan. Over 20 years ago he gave me the tuberous begonia and advised me to study and breed it. This served as the point of start of the study of the tuberous begonia for me.

Around that time I came to be acquainted with Mr. Frank Reynolds of Capitera in California and obtained the tuberous begonia from him on the introduction of Mr. Jack Graig, a designer and *Iris ensata* fancier of the United States. But the tuberous begonia withered in three or four years because it was sultry in summer in Kakegawa city where I lived and because my breeding technique was immature.

At that time the Sankei newspaper company requested me to grow flowers in the skiing ground 1,000 metres above the sea level called Biwakobare which it ran. So I recommended to plant the tuberous begonia, assigned Mr. Yoshie to lead the technical work and suggested to obtain the tuberous begonia from Mr. Reynolds. My suggestion was accepted and the glasshouse for the tuberous begonia first came into being in Japan. With success of this undertaking the Sankei newspaper company built the Amaki Plateau Begonia Flower Garden on Mt. Amaki in Izu. This great success at once aroused interest in the tuberous begonia in Japan.

At that time I refrained from growing the tuberous begonia independently and preferred to help my mentor Mr. Yoshie to succeed. However, continuing research, I deepened exchange with the specialists in the tuberous begonia in different countries.

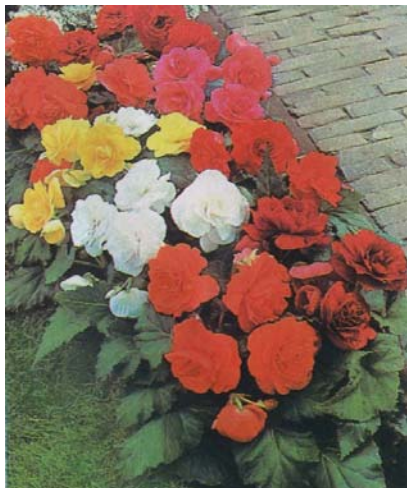
Several years ago Mr. Yoshie could not continue growing the

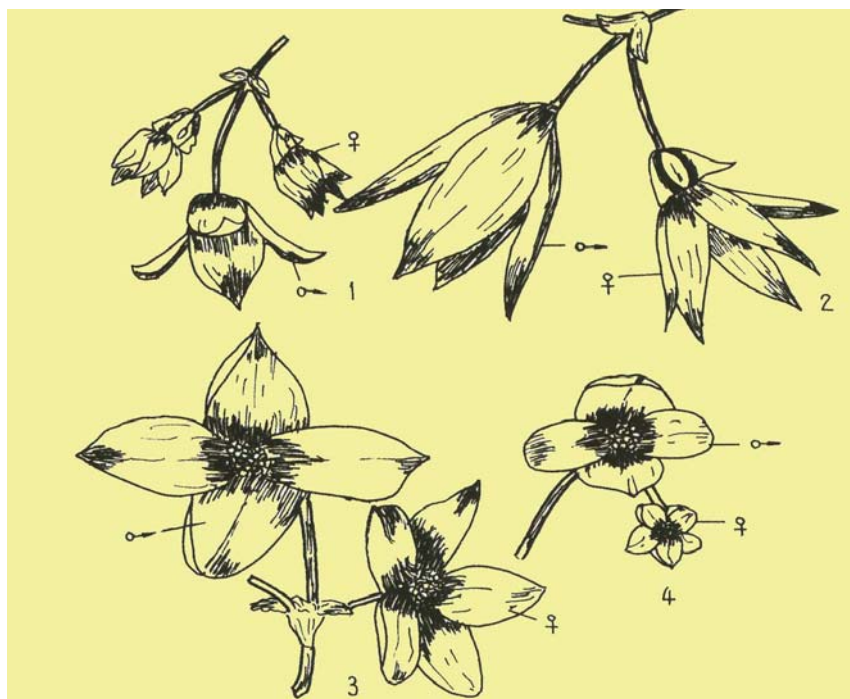
tuberous begonia on account of his old age and poor health. So he advised me to do it myself.

So I made up my mind and anew began research into the tuberous begonia and improvement of its species, introducing all the achievement in the world, to say nothing of those of the Yoshie school. My research work rapidly progressed with the cooperation of Mr. Rangdon of Bristol in England, Mr. Anternery of Santa Cruz in the United States, Mr. Joba of Capitera and Mr. Rokerich of Belgium and could say with pride that I reached the level unexcelled in Japan.

This year I have built the tuberous begonia exhibition on an area of about 400 square metres in my head flower garden in Kakegawa city and placed 2,000 potted begonia plants on display there, which won great popularity. At present I am growing several thousand plants in the central flower garden and in the branch flower garden whose total area amounts to 1,500 square metres. Next year I intend to grow it on a large scale, building a glasshouse with an area of 8,000 square metres.

Modern varieties of begonias





Forms of flowers of the species of primary crossbreeding

1. *B. Sedenii* (1869)

2. *B. Chelsonii* (1870)

3. *B. Intermedia* (1871)

4. *B. cv. Queen of the whites* (1878)



QUALITIES OF THE KING FLOWER

I first visited the Democratic People's Republic of Korea in 1985. Seeing Kimilsungia in the Central Botanical Garden at that time, I thought why there was no Kimjongilia.

During my stay in Korea I gave a lecture in the Central Botanical Garden. Then I suggested that *Amur adonis* would be good as the flower which would bloom on February 16.

I sent the flower as a gift in January the next year. But when I thought it over, the flower of *Amur adonis* was low in height and was no good to see and was not red. So I came to think whether there was any better flower. Thus I came to think of the tuberous begonia. I began to crossbreed flowers to obtain a new flower which is scarlet and magnificent and has noble quality.

Ichie who took charge of breeding at once took the first Kimjongilia (Kimjongilia-1987) as the parent flower for crossbreeding and set to artificial pollination for the next generation and collected seeds. He sowed the seeds to make them sprout. He chose the best of them and named them "Kimjongilia-1988". I intended to take it with me when I would visit Korea in February 1988.

The following points had to be taken into account in crossbreeding and selecting Kimjongilia:

- The flower must be glossy and red,
- It must be magnificent and polypetalous flower,
- It must have dignified and harmonious form,
- It must put forth many sturdy flowers,
- It must have unique characteristics.

The colour and form of "Kimjongilia-1987" were good but it was not sturdy and gradually became weak in the course of crossbreeding and seed selection for the next generation and could not pass summer. So the species was maintained for cutting.

It is not easy to breed a new flower which is large, sturdy,

"AZALEA OF THE MOTHERLAND"

When spring comes every year the flowers come out everywhere on the hills and fields of Korea. From olden times people love this flower because

Azalea



it heralds spring first. Associated with the story of the days of the bloody sacred war for national liberation, azalea is the favourite flower of the Korean people.

In May Juche 28 (1939) one unit of the Korean People's Revolutionary Army led by Commander Comrade Kim Il Sung advanced into the motherland. It was full-blown azaleas that gladly welcomed first the fighters who set foot on the land of the motherland. Women-guerrillas were in deep emotion burying their faces in azaleas. Immediately Kim Jong Suk, an anti-Japanese heroine, broke an armful of azalea and gave it to the Commander.

The Commander said with warmth, looking around at his men:

"The azalea of the motherland looks beautiful all the more as we look at it."

Burning always with the love of the motherland, inspired by the Commander, the fighters crossed countless dangerous lines and finally met the new spring of national liberation.

The azalea is the brush belonging to the azalea family. It grows two or three metres high and puts forth many branches. Its bark is greyish maroon. Young branches have fine hair. The leaves adhere to the stem alternately and leafstalk is short. In autumn the leaves turn red or copper colour. The body of leaf is shaped like the broad willow leaf.

The flower comes out by one from one flower bud before leaves come out in April or May. One or five flower buds come out from the tip of the branch of the last year. The flower is three or five centimetres across and is light purplish red. The corolla of the flower is funnel-shaped and divides itself into five at the tip. The petals have green markings. It has ten stamens and one pistil. The fruit is dehiscent and matures in September or October.

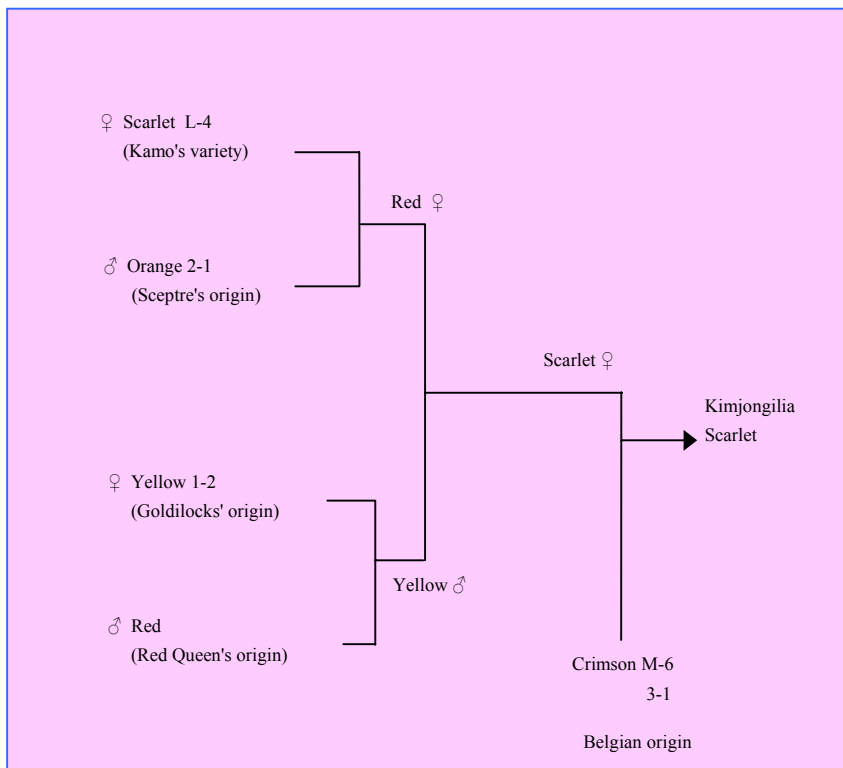
polypetalous and well-balanced in form and red. It requires time and energy. But I am convinced that “Kimjongilia-1988” would be by far better than “Kimjongilia-1987”.

September 17, 1987

The Characteristics of Kimjongilia

1. Its colour is glossy and enthusiastic crimson which is an ideal pure colour.
2. It has the quality of the king flower as the well-balanced polypetalous flower of lion-form flowering.

Process of Breeding of Kimjongilia



**Table of the Size, Mass and Thickness of Flower and Number of Petals
According to the Grades of the Flower Size**

<div>Index</div> <div>grade of the flower size (cm)</div>	diameter of the flower cm	thickness of the flower cm	mass of the flower g/unity	number of petals (unity)		
				the expanded	the unexpanded	
					coloured	colourless
10~12.0	11.1	6.5	14.6	24.0	5.4	5.4
12.1~14.0	13.7	7.4	20.9	28.4	9.9	8.3
14.1~16.0	15.1	7.5	23.2	31.6	8.3	6.0
16.1~18.0	16.6	9.0	35.0	33.6	9.6	7.5
18.1~20.0	19.6	10.5	47.4	39.4	10.4	7.0
20.1~22.0	20.6	12.0	48.7	40.5	13.0	8.5
22.1~24.0	23.3	14.1	52.8	42.7	12.7	8.4

3. The flower is 20 centimetres in diameter when well grown and is vigorous.

4. Its stem and flower stalk are all thick, sturdy and magnificent.

5. It can be widely propagated because it resists blights and harmful insects and it is easy to grow.

The scientific name of this new flower is *Begonia X tuberhybrida* Voss 'Kimjongilhwa.'

May 17, 1987

THE LETTER SENT TO HIS EXCELLENCY KIM JONG IL

I send this letter with the feeling of respect and admiration for the great leader Your Excellency Kim Jong Il.

I send you the tuberous begonia I bred with sincerity, congratulating Your Excellency on your 46th birthday and hoping for better friendship between Japan and Korea.

I am very sorry that although I wanted to carry it myself to Pyongyang I had to hand it over to Beijing due to the unjustifiable ban on exchange decided by the Japanese government and the United States and south Korea, too.

I scrupled to name my immature plant after Your Excellency's august name, but I dared to name it Kimjongilia, wishing you a long life in good health and the bright future of prosperity and development.

If you allow me to present this plant to Your Excellency, I will take it as honour more than I deserve.

I sincerely wish Your Excellency a long life in good health.

February 13, 1988

The interior of Kimjongilia Hothouse in the Central Botanical Garden





Kimjongilia sent by Dr. Kamo Mototeru



Male flower



Female flower



Flower bud



Fruit



Stem



Leaf

HE LOVES FLOWERS



– STORY OF MRS. KAMO HYO GYONG
SISTER OF THE FLOWER DOCTOR –

HOME OF FLOWER OF "BEAUTIFUL MIND"

Our home was in Harasato village some distance away from Kakegawa city in Shizuoka Prefecture. It was an old-style house where several generations of Kamo family lived from the time of my ancestors.

After my aunt had got married, my grandmother, mother, my sister and brother and I lived in the house. I was one year older than Mototeru who was born in 1930, so some

considered us twins.

The house was built with axe and adz over 300 years ago. It was rare to see old houses even in Shizuoka Prefecture. In the flowering season the *Iris ensata* planted in the yard thrived and many people used to gather there to look at them.

The *Iris ensata* in the yard are said to have been planted by my grandmother. The local people called them “cuckoo

FLOWER OF FILIAL PIETY

The flower of filial piety which was named personally by the great leader

Flower of filial piety



Comrade Kim Jong Il is the flower blooming in early spring which belongs to the family *Primulaceae*. 20-40 flowers come out in one plant, arranged in umbel on the flower stalk which comes forth from the flower bud. The colour of the flower is mainly red, pink, white, yellow, cream or violet according to the series. Besides, there are flowers of intermediate colours. The flower usually measures five or seven centimetres and has five to eight petals. One flower is in bloom for 15-20 days.

The flower of filial piety is the flowering plant liking low temperature and grows well at the temperature of 10-15°C. It is propagated by seed and by separating the roots.

flower” or “rice transplanting-associated flower” as they gave strong impression of the season. Many people including peasants loved the *Iris ensata* because the flower which is in full bloom in the sultry rainy season is out beautifully keeping constancy even in rain. That is why the flower was also called “beautiful mind”—another flower word.

Once my mother told me about Shoya. Shoya’s house was at the foot of a hill in the rural village at the seaside. It overlooked the field and sea. One summer day Shoya who was mending farm implements in his yard looking in the direction of the sea, straightened his back. He was surprised to see the tidal wave surging on from the horizon. He had to inform the village people in the field quickly, but had no time. Shoya set fire to the eaves of his house. The fire flared up in no time and the village people who were at work in the field came running

to Shoya’s house. Shoya shouted to them to climb up the hill for refuge till the last man in the village went up the hill.

Shoya’s house burned down but the village people were saved.

At that time *Iris ensata* grew in his yard. Shoya was not seen and the house burned down but the flowers welcomed the village people.

The *Iris ensata* of “beautiful mind” was together with the peasants and bloomed rather more beautifully in the rainy season. This flower was the first flower we saw when we were born and came to love.

My mother, too, loved *Iris ensata* very much. She tended carefully the *Iris ensata* planted by my grandmother and bred several new varieties of it. Village people much marvelled at the new varieties of the *Iris ensata* my mother bred. They transplanted the flower.

Name was given to the unique

VARIETIES OF *IRIS ENSATA*

Dr. Kamo Mototeru presented to the great leader Kim Il Sung 14 varieties of *Iris ensata* on March 30, Juche 71 (1982) and 71 varieties of *Iris ensata* on

Iris ensata



November 6, Juche 74 (1985).

Iris ensata is the perennial plant belonging to the family *Iridaceae*.

Leaves collectively form a cluster and it grows 60-80 centimetres high, and some, 110 centimetres high. Flowers are reddish violet. They are in bloom for about 20 days from late May to mid-June or from early June to late June according to varieties. It is planted in flower gardens or widely used as cut flowers because the flowers are beautiful and the leaves are long and vivid.

new varieties of *Iris ensata*. One variety of it was named “Kamo Manri” as my mother wished. She named it so, wishing that the intention of the Kamo family which loved the “beautiful mind” was made known far and wide.

Thus in our home it became custom to give name to the new varieties of the *Iris ensata* when they were bred and each time it was an august event for us. My grandmother always used to point out the need to breed the “patron

flower” to guard Kamo family.

My mother took an active part in public welfare service in the period after the Pacific War. She took 3,000 plants of *Iris ensata* with her to the Japanese Mothers Conference. At that time the local newspapers which reported the event showed the participants with the flower in their hands.

Probably because of this, people called our home the “home of *Iris ensata*” where the flower of “beautiful mind” blooms beautifully.

THE FLOWERS HE LOVED

Mototeru had many bold ideas and varied tastes when young. He often did kite flying and then took to making and flying a model plane. He once came in first or second in the model plane competition held in Kakegawa city. Once he littered the room with the radio parts he had bought saying that he was going to assemble a receiver and did not allow anyone to enter the room. So the room was not cleaned for several days. By the receiver he assembled our village people listened to the

US army radio broadcasting and heard before anyone else the news that Japan was defeated in the Pacific War.

Once he went to his aunt's house to play on the piano and stayed there for several days without returning home. On another occasion he used to chin the bar with the intention of becoming a heavy gymnastics player. I often saw that he was chosen as a heavy gymnastics player in his university days. He once "invented" the mouse-catching device and tried to catch 40 mice one

VARIETIES OF *AMUR ADONIS*

Dr. Kamo Mototeru presented to the great leader Comrade Kim Jong Il six varieties of *Amur adonis* on January 20, Juche 75 (1986).

Amur adonis is the perennial plant belonging to the family *Ranunculaceae*. The stalk erects straight and grows 5-15 centimetres high in the beginning of flowering and later up to 30-40 centimetres high. The stalk branches and is covered with short hair.

Leaves are twice feathered double leaves with pointed tip. The stalk or

branches end in one flower which is glossy yellow.

Amur adonis



VARIETIES OF NARROW DWARF DAYLILY

Dr. Kamo Mototeru presented to the great leader Comrade Kim Jong Il 125 varieties of narrow dwarf daylily on November 25, Juche 75 (1986).

Narrow dwarf daylily is the perennial plant which belongs to the lily family.

It naturally grows on all hills and in the fields of Korea. It is also planted and tended by people.

Its other name is *nomnamul*. Daylily includes large daylily, bride daylily, baby daylily, large-leaved daylily and evening daylily.

Several branches come out at the tip of thick and long flower stalks

and end in reddish brown or yellow flowers.

Narrow dwarf daylily



night by electric shock. But he admitted that it was a waste of time because there were not so many to be caught.

Any way his taste was varied.

Morning glory



But his love of flowers was the strongest of all.

Morning Glory

The flower he saw first was *Iris ensata*, whereas the flower he loved next was morning glory. It was after he had heard a poem about morning glory his mother recited. It told of the feelings of a woman who, going to the well early in the morning, saw the morning glory winding around the rope fastened to the bucket. She did not dare to pull up the bucket for fear that it might harm the flower. She went to her neighbour for water, instead.

Briar

Briar is the flower Mototeru has loved very much ever since his primary school days. It was after he had read a novel about briar.

The frontier guards of the two hostile countries stood facing each other with a rifle in their hands on the frontier between them. They only looked at each other without a word. They only looked at each other in the face without a word, with a rifle in their hands, even though days and

months had passed. One day a beautiful briar came out in bloom and put forth aroma on the frontier line running between the two soldiers. Each of the two soldiers looked at the briar and smiled. Since then, they smiled at each other and exchanged words.

Forget-me-not

Mototeru has loved very much the forget-me-not ever since his middle-school days. It has a story behind it.

A boy who was going to pluck a forget-me-not which bloomed beautifully on the

VARIETIES OF *HOSTA LONGIPES*

Dr. Kamo Mototeru presented to the great leader Comrade Kim Jong Il 70 varieties of *Hosta longipes* on February 12, Juche 76 (1987).

Hosta longipes is the perennial plant which belongs to the lily family.

Several leaves come out at the same time from the neck of the root. The form of leaves is elongated elliptical and they are round at the bottom and have very pointed tip. When leaves come forth they look like being rubbed and twisted. Hence its name *bibichu*. Thin and long

flower stalks come forth from the bract of leaves and bears 10-20 funnel-like and light reddish violet flowers in July or August, which come into bloom successively going upward from the bottom.

Hosta longipes





Forget-me-not

precipitous shore to please his beloved girl fell into the river, exhausted. The poor country boy threw the flower toward her and plunged into the river, leaving behind the remark, "Forget me not." The girl sobbed on the shore, calling her lover anxiously with the blue flowers in her hand....

I often saw Mototeru playing the famous music about such story of the forget-me-not on the piano.

Hosta Longipes

Mototeru who is the lecturer

for the N.H.K. radio broadcasting station once praised *Hosta longipes*, telling the listeners about flowers.

Turning to me, he said that if he was told to name the flower symbolic of the world, he would point to *Hosta longipes*. He saw *Hosta longipes* in front of Lenin's mausoleum in Moscow and in the garden in front of the queen's palace in London in England. "This time I saw *Hosta longipes* blooming beautifully on the shore of the Taedong River in Pyongyang," he said.

In addition, there were many flowers he loved. But the flowers he most loved were the flowers he presented to the great men he respected and adored, I suppose.

Balsam



LOOKING UP TO THE GREAT MEN

Mototeru returned home after graduating in economics from the Rikkyo University in 1953. His hoary old home where he passed his childhood remained as it was. The *Iris ensata* which bloomed in the yard gladly greeted Mototeru as in those days. If there was any change, it was that visitors to his old home and to the *Iris ensata* increased by far.

Mototeru thought that he could start an enterprise with his old home and *Iris ensata*. At his instance the Kamo *Iris ensata* garden was built in 1957 and he took charge of it. Since then breeding of *Iris ensata* proceeded in real earnest. He worked devotedly for the *Iris ensata* garden.

Mototeru thought that he should breed the best *Iris ensata* in the world. So he visited China, which was considered to be the home of *Iris ensata*, England, West Germany, the United States, Russia and other countries and

shared experience with world-famous horticulturists. In this course Mototeru became the leading specialist in *Iris ensata* in Japan. The world-famous horticulturists sent letters to him seeking his advice concerning *Iris ensata* and hoped to meet him. His works and treatises were published, evoking great interest of horticulturists. The representative of them are *Collection of*

Rhododendron aureum on Mt. Paektu



HISTORY OF FLOWERS

3.5 milliard years have elapsed since the birth of the earth in the universe. One hundred million years have passed since appearance of the flowering plants on the globe. Man existed on the earth two million years ago, whereas the history of flowers began by far earlier.

Flowers were not beautiful then. They were not good to look at either, having no petals nor sepals. It was flower organ rather than a flower. Namely, it was the flower organ of gymnosperms.

The flower in the true sense of the word came into being in angiosperms. However, at first even angiosperms had only pistils and stamens without petals and sepals. Such flowers are found even now in abundance. Maize and other wind-pollinating flowers can be cited as an example.

Petals, sepals and beautiful colours developed from the insect-pollinating flowers which began the action of reproduction with the help of insects.

In rose, orchid and many other flowering plants pollens are deposited on the anthers of pistils from stamens with the help of insects. In these flowers beautiful petals and sepals came into being to protect stamens and pistils and allure insects. They gradually began to diffuse aroma and secrete nectar.

Generally speaking, large, beautiful and deep-coloured flowers have no aroma, whereas small, light-coloured or white flowers diffuse aroma. It is because flowers evolved in two directions in order to allure insects: one was

to beautify their form and colour and the other was to diffuse aroma.

As insects began to carry pollens, flowers began to develop rapidly in such a way as to make the carriage of pollens easy. Soft and thin petals came to have bright colours and be more attractive due to their gloss and the effect of reflection.

The insect-pollinating flowers evolved from the shape of flower in which calyxes are deep and petals are arranged spirally as can be seen in the large-flowered *Magnolia kobus* to the shape of flower in which many petals are arranged in one plane and the difference between sepal and petal is not distinct as in the flower of *Ranunculus japonicus* and then developed to the shape of flower in which the differentiation of petal and calyx is distinct and stamens and pistils are arranged nearly in the same plane and which can be considered to be the standard of modern flowers.

Three-dimensional flowers again arose from the plane-shaped ones and evolved and gave rise to many flowers which are symmetrical in regard to both sides with the flower axial plane as the centre like *Aconitum sibiricum* and garden balsam.

Most of pure breeds of the tuberous begonias which are the pure breeds of *Kimjongilia* are such symmetrical flowers. Viewed in this light, the tuberous begonia belongs to the most developed modern flowers from among the insect-pollinating flowers.

VARIETIES OF *PRIMULA SIEBOLDII*

Dr. Kamo Mototeru presented to the great leader Comrade Kim Jong Il 32 varieties of *Primula sieboldii* on February 12, Juche76 (1987).

Primula sieboldii is a perennial plant which belongs to the family *Primulaceae*.

Primula sieboldii grows naturally in humid shade beneath trees or on the sunny places in the forest in the temperate zone including Korea.

It grows well in half shade. So it may be planted mixed with field flowers in parks, pleasure grounds, house gardens and flower gardens or in flowerpots at home.

It puts forth pretty white, light pink, deep pink, yellow or violet flowers which form collectively a large cluster

of flowers and is in bloom for a long time. It is very good for adorning window sill, table or interiors.

Primula sieboldii



Famous Pictures of Iris Ensata in six volumes and *The Latest Handbook of Iris Ensata*. He was invited as the lecturer in horticulture by the N.H.K. radio broadcasting station.

Mototeru could have amassed a big fortune if he had started an enterprise with flowers as he had thought at first. But he did not want to do business with flowers. He made up his mind to breed new varieties of flowers. He thought the flower must be symbolical of our time. He

wanted to name the flower after love, zeal, future, justice, truth and the like. For him the new variety of the flower was already not the “patron” flower for the Kamo family his grandmother had wanted.

Mother had always respected President Kim Il Sung. When she told of the story of the great men of the present age, she always spoke about General Kim Il Sung.

She was a girl when the Great Earthquakes of 1923 in

Kanto happened. At that time a blood-curdling event took place when innocent Korean people were murdered mercilessly. Then Mother very much sympathized with the Korean people. After the war Mother told us that the hero of the anti-Japanese war General Kim Il Sung returned home in triumph. When the Korean War broke out in 1950 Mother delivered an address opposing the war and the United States at the Japanese Mothers Conference. At that time Mother gave *Iris ensata* to the peace-loving Japanese mothers and appealed to them to fight for peace.

Later, Mother was included in a delegation representing the Japanese mothers to visit some socialist countries. She was busy preparing for the trip when she suddenly fell ill and passed away. At that time Mototeru picked up quite a few flowers of *Iris ensata* and covered her coffin with them.

When she tended the plants of *Iris ensata* she used to say that she would like to present the flower to President Kim Il Sung. Mototeru could reverentially present *Iris ensata* to President Kim Il Sung on April 15, 1982, his 70th birthday as Mother had wished. The gift flowers were

CAMPANULA PUNCTATA

Dr. Kamo Mototeru presented to the great leader Comrade Kim Jong Il 187 varieties of *Campanula punctata* on February 12, Juche 76 (1987).

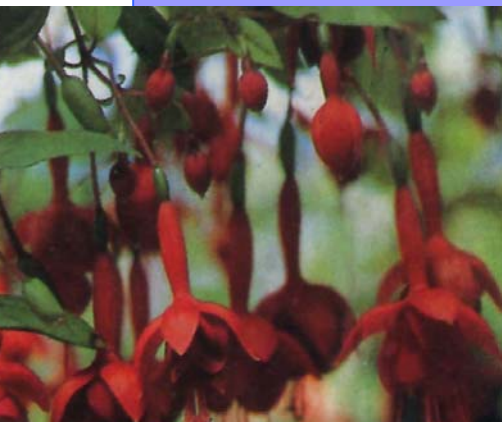
Campanula punctata is a deciduous

Campanula punctata

shrub which belongs to the family *Onagraceae*.

The shrub is 50-70 centimetres high and branches are thin and long and droop when flowers come into bloom.

The flowers come into bloom in June-August when it is usually warm and sun shines long. They bloom even in February or March when nutrition is good. Flowers are generally reddish violet. Red, white or white and red flowers, too, come out according to varieties. There are simple and multiple flowers in *Campanula punctata*. It is called *chorong* (lantern) flower because lantern-like flowers droop.

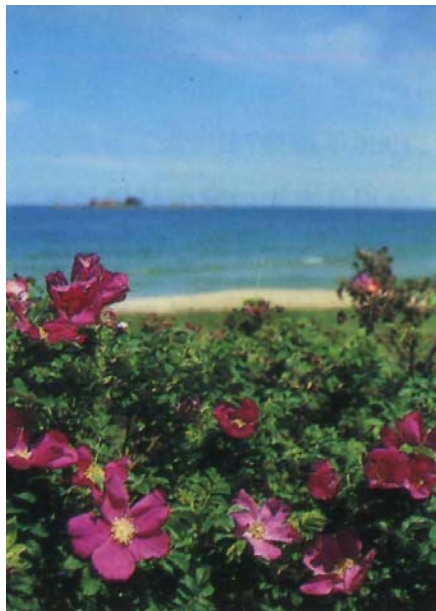


the 14 improved varieties of *Iris ensata* including “Kamo Manri” and “Spring Moon” Mother newly bred devoting her life to them and “The Evening Sun over the Old City” Mototeru newly produced.

On November 6, 1985 Mototeru again presented to President Kim Il Sung 71 varieties of *Iris ensata* he newly bred.

Mototeru read many of President Kim Il Sung’s writings. He came to know General Kim Jong Il only reading *Modern Korea and Kim Jong Il*, the book by Inoue Shuhachi who taught at the Rikkyo University from which he had graduated.

Since then he avidly read different works of General Kim Jong Il. In this course he came to know that President Kim Il Sung and General Kim Jong Il very much love flowers. He came to learn that they valued *Magnolia sieboldii* and other flowers which symbolize people’s love of the country and the



Rosa rugosa

nation and tended them in their gardens and that they saw that they were in full bloom all over the country.

Mototeru devoted himself to preparing the flowers to be presented to General Kim Jong Il. Six varieties of *Amur adonis*, 125 varieties of narrow dwarf daylily, 70 varieties of *Hosta longipes*, 32 varieties of *Primula sieboldii*, 187 varieties of *Campanula punctata*, 14 varieties of *Magnolia kobus*....

With the flowers, he sent the following letters to the General Bureau for Management of Mt. Taesong:

November 7, 1986

I send tuberous begonias, *Campanula punctata* and several hundred other plants selected from the plants I intend to send in celebration of General Kim Jong Il's 45th birthday. If they are bred in glasshouses, they will come out in bloom by February 16. If they are grown with devotion, they will amount to 3,000 plants.

January 1, 1987

I congratulate you on the New Year.

I intend to send about 350 varieties of different flowers in celebration of the birthdays

of President Kim Il Sung and His Excellency Kim Jong Il.

We have studied these flowers for long and are convinced that they are the best in Japan.

December 19, 1987

I will make persistent efforts for friendship and exchange in the world under the guidance of President Kim Il Sung and General Kim Jong Il.

I send 54 plants of 14 varieties of *Magnolia kobus* although they are modest and 1.5-ton class truck which is humble.

MAGNOLIA KOBUS

Dr. Kamo Mototeru presented to the great leader Comrade Kim Jong Il 14

Magnolia kobus

varieties of *Magnolia kobus* on December 27 Juche 76 (1987).

Magnolia kobus is a high tree which belongs to the magnolia family.

It is usually 10 metres high and the stem is straight and is much branched.

Their leaves are broad and shaped like an inverted egg. Their bottom is shaped like a wedge and their tip is pointed.

Flowers come in bloom by one on the ends of small twigs in April-May before new leaves come forth. Their colour is light reddish white.

It grows wildly in the forest in the middle of slope of mountains in Jeju Island in south Korea.



When Mototeru harboured great ambition to breed the most beautiful flowers in the world, he looked back on the flowers one by one which he loved from his childhood. He also considered the flowers he newly bred. Thus he chose the tuberous begonia. It was in the early 1960s. Research into breeding new varieties of the flower bore some fruit in the '70s and tuberous begonias were acclimatized to the climate of Japan. Of course, this was achieved in the course of repetition of failure, distress, research, efforts and new determination.

But when I saw Kimilsungia in the Central Botanical Garden on a visit to Korea in October 1985, I thought that there had to be Kimjongilia as well and pictured the ideal flower to be named after the great man. The new flower on such a high level was not in the world yet, but I thought it could be bred from the tuberous begonia if any.

The new variety of begonia he bred with devotion so far could already be sold at flower

shops with popularity never seen before at that time. However, Mototeru could not calculate it in terms of money.

Tagetes patula can be cited as the flower whose new variety cost horticulturists the largest amount of money in the world for breeding.

One horticultural company which appreciated the value



Common camellia

of the flower as the garden flower for its strong resistance to sunlight and long florescence resolved to do away with its drawbacks—its repulsive smell and simple colour. This made the company conduct research into the flower in real earnest. But it did not

succeed although it defrayed research expenses for over 20 years. The company was obliged to offer a prize of 50,000 dollars for breeding a new variety of *Tagetes patula*. Six years passed before success was achieved. Thus a new variety of *Tagetes patula* cost the largest amount of money in the world for its breeding.

Mototeru together with the staff set a high goal of breeding a perfect new variety of the tuberous begonia. He declared that only when the

new variety of flower becomes a perfect flawless famous flower can it be named after the great man. Breeding of an ideal new variety from the tuberous begonia cost Mototeru 26 years. It must have been quite a new variety of flower on the highest level which did not resemble rose, nor carnation nor camellia.

When Kimjongilia came into being in the world, journalists asked him what type of flower it was. At this he replied, "It is the Kimjongilia-type flower."

Gladiolus



Portulaca grandiflora



FORMS OF FLOWER

Flower is metamorphosis of leaf at the point where the receptacle is found, which is concerned with reproduction.

Generally, a flower is composed of peduncle, receptacle, sepal, petals, stamens and pistil.

To summarize the forms of flower, indeterminate flowers now do not exist and there are radial (star-like) flowers and left-right symmetrical flowers like orchid flowers. Generally speaking, it is considered that the flowers whose different parts make an integral whole are more evolved than the flowers whose parts are detached from each other and that left-right symmetrical flowers are more evolved than the radial flowers.

The flower of sunflower is aggregation of many flowers. In its centre there are tubular flowers which are surrounded by petals, which resemble the sun and look like one flower. Such flowers are called capitate flowers.

The flower of *Kimjongilia* has distinguished characteristics as an ornamental flower.

Generally speaking, there are the plants with monoclinous flowers which have both androecium and gynoecium and the plants with unisexual flowers which have only androecium or gynoecium. Azalea and daylily are plants with monoclinous flowers which have both a pistil and stamens. *Kimjongilia* is the unisexual flower in which all the stamens became petals.

There are dioecious plants for which female flowers and male flowers

bloom in different individuals and monoecious plants for which male flowers and female flowers bloom in the same plant. *Humulus japonica* is the dioecious plant for which the plant with male flowers exists separately from the plant with female flowers.

Kimjongilia is a monoecious plant. In other words, *Kimjongilia* is a monoecious plant with unisexual flowers.

The flower stalk of *Kimjongilia* comes forth from each bract of leaf going upward beginning with the 4-6th nodes of the stem of the flower and bears flowers.

The position of the node from which the first flower comes out depends on the methods of propagation and growing.

The first flower comes out from the 5th or 6th node in the plants grown from seed and from the 4th or 5th node in the plants grown from the tuber or by tissue culture. The flower stalk is 8-15 centimetres long and 0.8-1.2 centimetres thick. The flower stalks are round and light green or light purple and sparsely covered with short hair. They end in a pair of floral envelopes.

The floral envelopes are round or heart-shaped and are constricted inward. They are purple at the rim.

Within the floral envelope there are the peduncles of the male and female flowers separately. The peduncle of the male flower is 2-3.5 centimetres long and 0.5-0.8 centimetre thick.

The female flower of *Kimjongilia* is

scarlet and measures about 10-12 centimetres. It has five petals which are simple. The female flower has three styles of pistil which are 0.8-1 centimetre long. The style of pistil gradually broadens going upward and is much furrowed.

It has several ovules. The anther of the style of pistil is crowned with velvety protuberances.

The female flower has three winged ovaries. They are light green. The tip of the wing of the ovary sometimes is purple.

The male flower of Kimjongilia is valuable as an ornamental flower. The male flower is generally called flower.

The colour of the flower is scarlet.

Generally speaking, colour is characterized by three factors—hue, brightness and clearness. They are called the three attributes (three factors) of colour.

Colour is arranged in the order of red, orange, yellow, green, blue and violet. Colour is divided into 40 kinds, including the intermediate colours of the seven colours. These divisions of colour are called the shades of colour.

The red colour has 13 shades. The colour of Kimjongilia is bright red which is near 2.5-10th shade.

The brightness of colour is graded into 0-10. It is designated by figure with letter N attached after it. The brightness of the flower of Kimjongilia is (4-7)N.

The clearness of colour shows the degree of vividness of colour. For example, red colour includes pure red and dark red mixed with black colour with its pureness weakened. The latter is not bright.

The clearness of colour, too, is designated

by figure. The clearness of the colour of Kimjongilia is within 10-14.

According to the subdivided designation of colour the colour of Kimjongilia can be written (2.5-10)R, (4-7)N/10-14. Namely, the colour is red within the extent of 2.5-10, its brightness is in the order of 4-7 and the clearness is about 10-14.

The flower measures 10-25 centimetres and some are bigger than these. Generally speaking, there are large-shaped flowers and small-shaped flowers among the tuberous begonias. The flower of Kimjongilia is the very large one even from among the largest flowers. The flower size of other flowering plants is rather even, but the size of the flowers of the large-flowered tuberous begonia varies in a large measure.

Tuberous begonias including Kimjongilia grow ceaselessly and the diameter of the flower varies more than two times depending on different factors. The flower size changes depending on the conditions and method of growing and the order of the node. When Kimjongilia is grown in a greenhouse which is much affected by environment the flowers blooming in summer in the temperate zone are smaller than those in bloom in winter.

As for the average size of flowers according to the nodes in case the flowers are grown from the saplings bred by tissue culture, the second flower is the largest and the size of flowers decreases in order of the first, the third and the fourth.

But when Kimjongilia is grown in the fully automated greenhouse in which temperature, humidity and ventilation

**Forms of flowers of modern varieties of
the tuberous begonia**



Camellia form



Rose form



China pink form



Kimjongilia

are well regulated and good nutrition is provided to it, very large flowers of about 20 centimetres come out from each node till the sixth or seventh node beginning with the node from which the first flower comes out.

The flower is 5-10 centimetres thick. When the flower is more than 14-15 centimetres across, it is thicker than seven centimetres.

Generally speaking, the thickness of the flowers of the flowering plants is considered to be an important ornamental index. It is because when the flower is not considerably thick, however large it may be, it looks like a dish and is not good to look at.

Only when the rate of the size (d) to the thickness (D) of the flower of tuberous begonias d/D is smaller than two or about two, becomes it a dignified flower.

The rate of the size to the thickness of the flower of *Kimjongilia* d/D is 1.8-1.9 at the usual temperature in our country when grown in winter and 2.1-2.4 when grown in summer. Therefore, when *Kimjongilia* is grown in winter, its ornamental index is fully satisfactory. When it is grown in the automated greenhouse in our country in summer, the rate of size to the thickness of flower becomes 1.8-1.9 as in case of its being grown in winter.

The flower has 25-45 petals and some have even 50-55 petals.

The aggregation and multiplicity of petals are one of the main ornamental indices of tuberous begonias. The polypetalous flowers with 500 petals were produced from tuberous begonias but they have no value as ornamental

plants. Only when the number of petals is in harmony with the size and thickness of flower, has the flower value as an ornamental plant.

Kimjongilia has petals commensurate with the size and thickness of the flower.

Petals arose by transformation of pistils and stamens. The size and shape of petals vary according to the position of arrangement. Petals can be divided into coloured and expanded ones, coloured and unexpanded ones which form the centre of the flower in the central part of the flower, and uncoloured and unexpanded ones. The outer petals from among expanded petals are 7.5-8 centimetres long and 7.5 centimetres wide and round. The petals in the middle are 9.5-10.5 centimetres long and 7-7.5 centimetres wide and shaped like an inverted egg. The inner petals are 5.5-7 centimetres long, 3.5-4.5 centimetres wide and elliptical.

The shape of the flower is *Kimjongilia*-form or lion-type.

The basic characteristic feature of *Kimjongilia* distinct from those of other tuberous begonias is the shape of the flower.

The shape of flower is characterized by the size and thickness of flower, the size and shape of petals, their number and arrangement in space.

As was seen in the wild original pure breeds of tuberous begonias, *Begonia cinnabarina* and *Begonia pearcei* have four petals, two of which are large and the others are small. The flower of the *Begonia boliviensis* is shaped like an elongated tube and measures about 3-5 centimetres.

Taking these flowers as the original species, efforts were made for more than one hundred years to obtain better flowers, which resulted in breeding of the polypetalous flower species of the modern tuberous begonias. The species of early polypetalous flowers lacked harmony between the size and shape of petals.

Their modern species were more completed in the shape of flower and there appeared the rose-form and the China pink-form flowers and they have been admitted as the flowers of high ornamental value in the world so far.

In the rose-form flower the form of the whole flower is nearly round and its petals are somewhat flat and often overlap like roof tiles or fish scales. The China pink-form flower is characterized by serration of different sizes at the rim in the upper part of petals and the petals are flat and somewhat concave and less overlap each other and are arranged

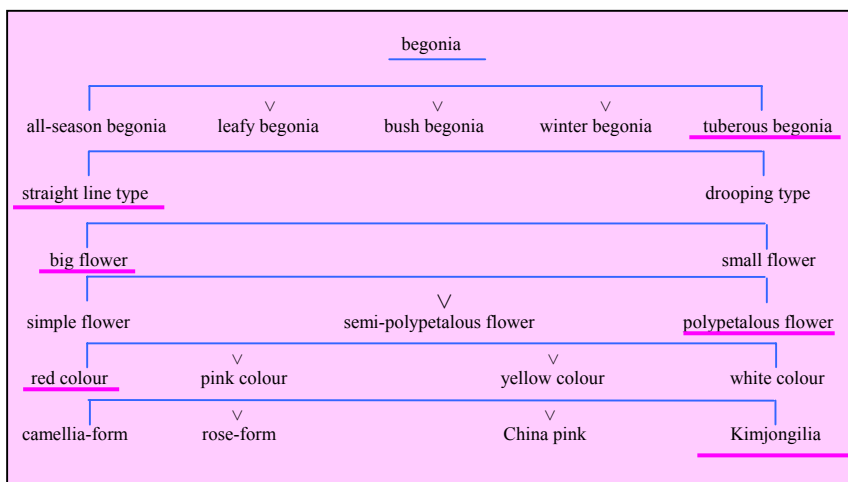
rather regularly. The petals of the camellia-form flower are round like those of camellia and in plenty.

The flower of Kimjongilia is not shaped like camellia-form, rose-form, or China pink-form flowers but has original shape.

The contour of the flower is roundish like the rose-form flowers and the petals are elongated and elliptical and flat and wave-like. The flower is graceful and smart to look at as it has harmoniously arranged spatial structure within the contour of the flower.

Dr. Kamo Mototeru called this type of shape Kimjongilia-form or lion-type. Many large-flowered tuberous begonias were known so far but there was none deserving of being called lion-type. Kimjongilia alone can be called lion-type for its beauty, magnificence, originality and well-knit spatial structure.

Position of Kimjongilia in the Begonia Series



PROVERBS RELATING TO FLOWERS

- With care a flower can come to bloom on a rock.
- A big flower-bud brings forth a big flower.
- No flower comes into bloom without being exposed to wind and rain.
- Butterflies flock to good flowers.
- A flower must be kept in bloom.

VARIETIES OF LILY

Dr. Kamo Mototeru respectfully presented lily to the great leader Comrade Kim Jong Il on February 13, Juche 83 (1994).

It is a perennial bulbous plant.

The bulbs are egg-shaped or round and flat and white or yellow. Its stalks

grow straight or obliquely upward and are covered with purplish maroon markings and white hair. Lily puts forth alternate or verticillate leaves. They nearly have not petiole or rarely have it. The leaf is shaped like willow's leaf, line or heart and has parallel veins. Some put forth heart-shaped cormels in the bracts of leaves. Orange, reddish orange or white flowers bloom drooping downward, or turning sideway or upward in indeterminate inflorescence at the tips of the branches.

Lily has six sepals in all—three outer sepals and three inner sepals. It has six stamens and one pistil which is longer than the stamens.

The colour of flowers is crimson, red, light pink, light purple of the anthocyan series, red, yellow and orange of the carotenoid series and white, yellow and orange of the flavone series.

When flowers are in full bloom, they diffuse aroma. Its fruit is elongated and round and dehiscent.

Lily



WIDE PROPAGATION



**– STORY OF THAK YANG WON, VICE-CHAIRMAN
OF THE KOREAN KIMJONGILIA FEDERATION –**

KIMJONGILIA HAS APPEARED IN THE WORLD

The Korean Central News Agency reported on February 20, Juche 77 (1988):

Kimjongilia, the immortal flower named after the august name of the dear Comrade Kim Jong Il, has appeared in the world.

Kimjongilia is a rare beautiful flower which Kamo Mototeru, in charge of the Kamo *Iris Ensata* Garden in Kakegawa city in Shizuoka Prefecture in Japan, has newly bred through protracted energetic research with the feeling of intense respect and adoration.

The lovely large flowers of Kimjongilia come into bloom successively in order of arrangement for over 120 days. The beautiful flowers dazzle onlookers. It rapidly propagates and is easy to tend.

Kimjongilia is a perennial flowering plant which belongs to the begonia family. Its stalk grows straight and is 30-70 centimetres high. Its leaves are asymmetrical and elongated. Male and female flowers

come out separately in the same plant. Male flowers are bigger and more splendid than the female ones. Female flowers have ovary at their bottom.

The first flower of Kimjongilia comes out from the fifth or sixth node and then 10-15 more flowers come into bloom successively going upward at each node for several months. The male flowers measure 10-20 centimetres across and 25 centimetres across at most.

Presenting the flowers and sending the congratulatory letter to Comrade Kim Jong Il, Kamo Mototeru who has devoted his whole life to horticulture said that it was his lifelong desire to breed the most beautiful and rare flower and name it after the august name of the peerless great man respected and adored by all to convey it to posterity for ever.

He said that he deems it the greatest honour and pleasure that on the occasion of the 16th of February he conveys

the Kimjongilia he has newly bred through over 20 years of his energetic efforts to the dear leader His Excellency Kim Jong Il who is leading the Korean people with great leadership ability and contributes to friendship and solidarity between the Korean and Japanese peoples and the cause of the world

peace, and wished him a long life in good health.

Kimjongilia together with Kimilsungia which came across continents and oceans will be in full bloom for ever across the country, taking roots in the land of the prosperous Juche Korea amidst the intense love of our people.

The interior of Kimjongilia Hothouse



SPREAD ACROSS THE COUNTRY AS THE FLOWER OF LOYALTY

The news that Kimjongilia has appeared in the world inspired great excitement and pleasure in our people. This made them feel the national pride that they live with great Comrade Kim Jong Il at the helm.

Many people from different parts of the country visited the botanical museum of the Central Botanical Garden to see Kimjongilia.

Many writers and artists began to sing the flower in poems, songs and works of art.

The visitors expressed their earnest desire to grow the flower in their work place and home. Numerous telegrams and letters

telling of their desire came.

The Kimjongilia Hothouse began to be built in the Central Botanical Garden as desired by all the people of the country.

At the news many people came rushing to the place from the different parts of the country. Among them were housewives, youth and students.

Needed equipment, materials, tools, humus soil, peat and flowerpots were sent there.

The People's Army men, too, sent there the cases of good humus mold together with letters.

Likewise the Kimjongilia Hothouse with an area of over 1,000 square metres was built at the foot of Mt. Taesong in the suburbs of Pyongyang amidst the great concern of all the people of the country and opened to the public on April 10, Juche 77 (1988).

The glasshouse became a breeding farm to propagate the newly bred Kimjongilia in the whole country.

The Central Botanical Garden formed the Kimjongilia

Popular embroidery





Korean painting *Kimjongilia*

study group and energetically pushed ahead with research work to solve the scientific and technical problems arising in propagating and growing the flower.

The Party and government provided the garden with necessary equipment including up-to-date experimental facilities and reagents.

Japanese horticulturist Kamo Mototeru gave lecture and shared experience in its growing with people in the Kimjongilia Hothouse of the Central Botanical Garden, visiting it on several occasions

and sent them reference books.

As a result, the study group has established the method of growing and propagation of Kimjongilia commensurate with the climate of Korea in a little over one year and settled a number of scientific and technical problems.

The scientific and technical symposium of botanists of the country was held with a view to growing more beautiful Kimjongilia in May Juche 78 (1989).

The gathering was attended by many noted scientists and technicians of the country and

Research into Growing and Propagation of Kimjongilia, Research into the Tissue Culture of Kimjongilia and other valuable research data were made public.

With rapid growth of public interest and demand for Kimjongilia the important task facing scientists was how to propagate Kimjongilia on a mass scale in a short time.

In order to solve this problem scientists put a great effort into the study of the method of propagation by tissue culture, the up-to-date method of breeding.

Propagation of orchid, China pink and other flowering plants by tissue culture was in the stage of industrialization in those days but the case with begonias was different.

Moreover, there were almost no published research data concerning the tissue culture of tuberous begonias.

Our scientists stubbornly pushed ahead with research work and succeeded in settling the problem of its mass propagation by tissue culture.

As a result, tens of thousands of saplings came to be produced in one year.

Visiting the tissue culture room of the Central Botanical Garden, Kamo Mototeru said that the level of tissue culture of Kimjongilia in

Korea surpassed the world standard.

When the Central Botanical Garden bred Kimjongilia on a mass scale all the people of the country wished to grow it.

The Kimjongilia hothouses began to be built in the botanical gardens of all provinces and counties. In a few years the Kimjongilia hothouses have been built at the dear leader's native home in the Secret Camp on Mt. Paektu and in all the counties of Ryanggang Province.

The unknown efforts of labour hero Kim Kyong Bok of the Kim Jong Suk County Management Office and his brothers did much to bring Kimjongilia into full bloom in the garden in front of the dear leader's native home in the Secret Camp on Mt. Paektu.

After being discharged as chief sergeant from the People's Army in May Juche 79 (1990) Kim Kyong Bok obtained six plants of Kimjongilia in the Central Botanical Garden and headed for Mt. Paektu. He experimented with growing it for two years in Rimyongsu at the foot of Mt. Paektu and transplanted it to the glasshouse in the Secret Camp on Mt. Paektu.

The climate on Mt. Paektu was extremely rigorous.

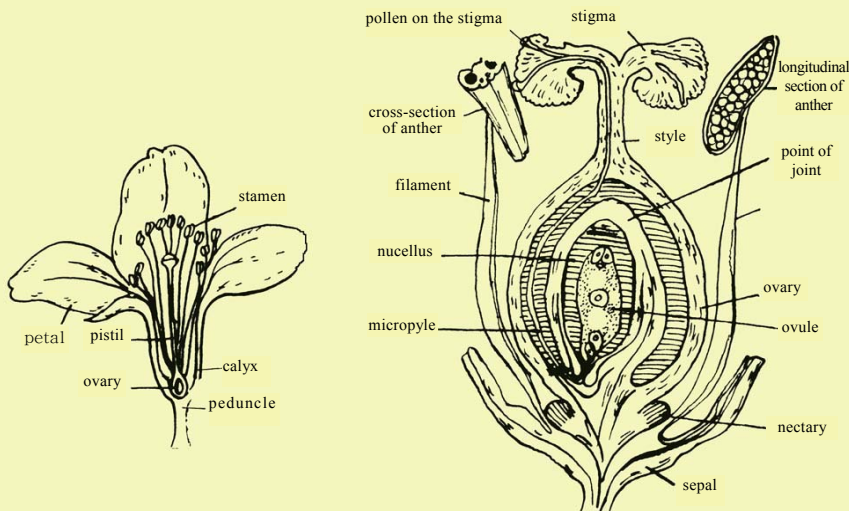
THE STRUCTURE OF FLOWER

The flower is a special reproductive organ of angiosperms which produce seeds and fruit at maturity. Morphologically the flower arose by transformation of bud at the point of the internode which is not branched and is very much contracted.

The flower consists of receptacle, sepals, petals, stamens and pistil. The receptacle is the expansion of the tip of peduncle to which other elements of flower adhere. Sepals are arranged at the outside of the flower and usually consist of several calyxes and protect the inner parts of it. Petals collectively form the corolla. Calyxes and corolla form a perianth. Stamens are arranged inside corolla and the pistil is in the central part. The stamen consists of pollen-sac and filament. The pistil is composed of stigma, style and ovary.

The ovary contains ovules which develop into seeds after fertilization.

The flower which has both androecium and gynoecium is called monoecious flower and the flower which has only stamens or pistil is called unisexual flower. The flower which has only a pistil is called female flower while the flower which has only stamens is called male flower. The plant in which both male flowers and female flowers bloom in one plant is called monoecious plant. The plant for which female flowers and male flowers bloom in different individuals is called dioecious plant.



Component parts of flower

The structure of flower



Dance Song of Wish

The snow which fell one night piled up to the eaves of the glasshouse and the raging snowstorm even broke off the electric wire.

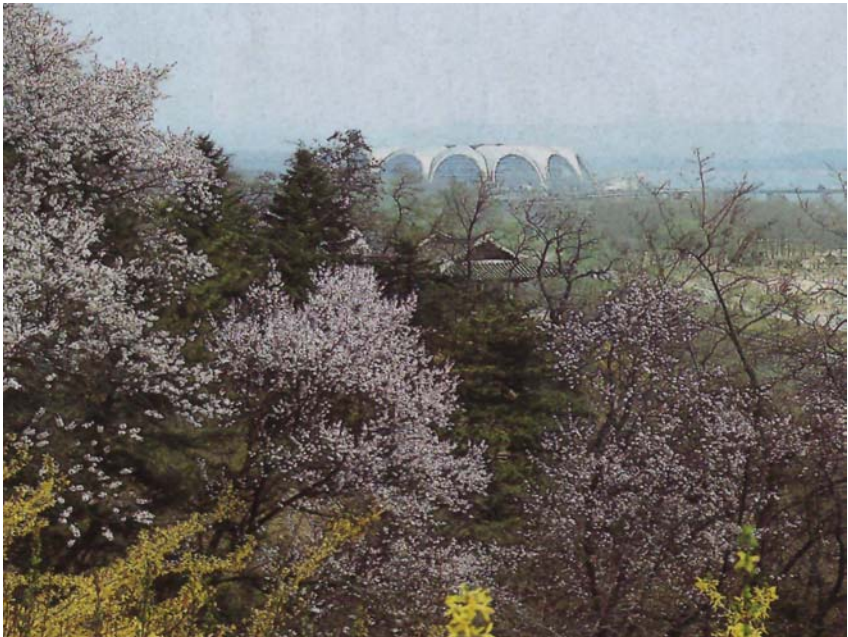
Kim Kyong Bok and his brothers continued growing Kimjongilia on a trial basis for several years to bring it into bloom in the yard of the dear leader's native home in the Secret Camp on Mt. Paektu. They hardened the plant at low temperature and in the unfavourable conditions at the time of sapling. At last, in the summer of Juche 82 (1993) they brought 16 plants of Kimjongilia into bloom.

The great leader President Kim Il Sung, who visited the Secret Camp on Mt. Paektu in the summer that year, saw the full-blown flowers of Kimjongilia in the yard of the old home.

They seemed to have appealed to him at first sight. He said that the Kimjongilia in bloom looked more beautiful at the native home of Comrade Kim Jong Il. The father leader who met Kim Kyong Hui and Kim Kyong Wol in the secret camp at that time posed for honorable souvenir photograph together with them in work clothes.

They were ordinary soldiers and workers who did not receive professional training and had no experience in flower growing but brought Kimjongilia into bloom in the Secret Camp on Mt. Paektu. There goes a saying, “With care a flower can come to bloom even on a rock”. The intense loyalty of our people brought the flowers into bloom on Mt. Paektu.

Spring on Moran Hill



ACROSS CONTINENTS AND OCEANS

Kimjongilia, which was born with the blessing of all people, has spread over more than 60 countries in a rather short period.

The rapid propagation of Kimjongilia is not only because of its unique beauty. It symbolizes the high reverence and respect of the people of the world for the great leader Kim Jong Il.

An overseas Korean, who had come from Los Angeles to participate in the World Festival of Youth and Students held in Pyongyang in Juche 78 (1989), visited the Kimjongilia Hothouse.

Completely charmed with the beautiful Kimjongilia, he expressed his wish to bring it into bloom in the United States and returned taking some tubers with him. One year later a letter came from him addressed to the Central Botanical Garden.

In his letter he said: "...

The Kimjongilia tubers which I brought with me at that time is blooming beautifully in the United States.

"All my family and compatriots looked at the flower with mouth agape and amazed at its brilliant red colour. In commemoration of the day when Kimjongilia has bloomed for the first time in America, they were posed for a photograph, the flowers in the centre, and held a banquet.

"A few days ago an American who lives in the coastal area visited me and asked me to help him to grow the flower. As days go by more and more people became fond of this flower."

A photo of Kimjongilia he brought into bloom was enclosed.

Ramid Mertzi of Ecuador also grows Kimjongilia at home. He visited Pyongyang through long journey as his father and all his family wished.

Robert de Belder, president of the International Arboricultural Society, visited Pyongyang accompanied by his son, a botanist, and all his family and studied the method of growing Kimjongilia in detail.

Singapore newspaper *Straits Times*, Indonesian newspaper *Compass* and *Jakarta*, Norwegian newspaper *Aftenposten*, Peruvian newspaper *La Tercera*, Congolese newspaper *Mweti*, Pakistani newspaper *Leader*, Thai newspaper *The Nation*, Bangladesh newspapers *Bangla Bani* and *Deizo Zonota* and many other foreign newspapers carried reports and featured Kimjongilia under different headings like “Charming Flower”, “The Most Beautiful Flower in the World”, “Kimjongilia in Full Bloom”, “Red Flower Newly-bred in Reverence of His Excellency Kim Jong Il”; all in praise of the beautifulness and rareness of Kimjongilia.

In an article titled “Kimjongilia in Full Bloom” the Indonesian newspaper *Jakarta* said:

“Red flower symbolic of fervent ardor, flower bud seeming a flaming torchlight and green, heart-shaped leaves supporting flowers all agree with the sentiment and aspiration of the Korean people.

“Kimjongilia is really an immortal flower representing the boundless loyalty of the Korean people to His Excellency Kim Jong Il.”

Today Kimjongilia hothouses are built in many countries. The Yanji Korea-China Friendship Flower Garden Co. Ltd. in China has opened the Kimjongilia Hothouse on a 800 square metres plot. In the Mongolian capital of Ulan Bator too, a Kimjongilia Hothouse was opened.

It is said that the Ukmit Flower Garden in California, the United States, cultivates hundreds of Kimjongilias.

With the passage of time the number of people loving this flower is increasing.

AWARDED GOLD MEDAL

During May 1-11, Juche 80 (1991) the 12th International Flower Show was grandly held at Bratislava, a city located on the shore of the River Danube in Czechoslovakia.

The examination of flowering plants started at 5 a.m. until 3 p.m. of April 30.

There exhibited were over 820 items sent by 103 flower-producing companies, organizations and research institutes of 13 countries including the

Netherlands, Belgium and Austria.

The Kimjongilia, exhibited by the Central Botanical Garden of the General Bureau for the Management of Mt. Taesong of Korea, was No. 674.

The jury which consisted of 50 members began its work at dawn, but it was in the afternoon when they reached the show stand of Kimjongilia.

Conspicuously large flower in full bloom, fascinating petals, evenly dyed with red colour, giving out fervent liveliness, heart-shaped green leaves giving freshness and sturdiness ... such was the very Kimjongilia attracting people's hearts.

That day at the general examination the jury decided to award the special prize and gold medal to Kimjongilia.

The show was opened on May Day. That evening the jury, in consideration of all views of spectators, conferred the special prize, the highest prize of the show, and the gold medal on Kimjongilia.

Platycodon grandiflorus



At 8:30 p.m. the TV reported the news of the 12th International Flower Show, and out of the 15 minutes' report time, 7 minutes was dedicated to Kimjongilia. The following day Kimjongilia hit the headlines of the major newspapers in Czechoslovakia.

Austria, Germany, Italy and other neighbouring countries also covered the news that Kimjongilia was awarded the special prize and gold medal.

The exhibition hall of Kimjongilia was visited by more than 50,000 people every day. The show had to be extended for a day as a result.

The organizing committee of the show decided to give away the flowers on display at 8 p.m. of the last day. The exhibition hall was crowded with people who came a few hours earlier and

the flowers had to be given to them at 5 p.m., three hours ahead of schedule.

During August 8-18, Juche 86 (1997) a flower fair was held in a grand way in Jilin city, China.

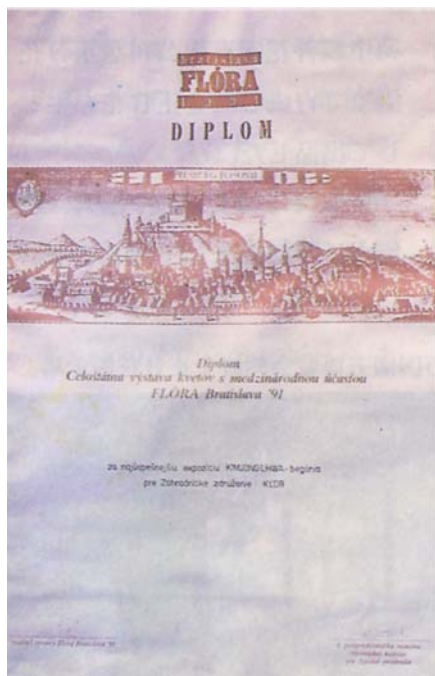
On display were over 12,000 flowering plants and visual aids by Changchun, Jilin, Yanji, Tonghua and other cities and counties of Jilin Province.

Yanbian Koreans' Self-governing Province exhibited as the main flower Kimjongilia grown in the Kimjongilia Hothouse of the Yanji Korea-China Friendship Flower Garden Co. Ltd.

A lot of Chinese people, Korean compatriots, foreigners and tourists visited the flower fair. All admired Kimjongilia. A researcher of the Beijing Phytophysiology Institute said after going round the flower fair:

**The showroom of the Korean Kimjongilia at
the 12th International Flower Show**





**The special prize and gold medal awarded to Kimjongilia
at the 12th International Flower Show**

“Kimjongilia is a flawless flower in a botanical view. It is the flower which is easily understandable to everybody even without explanation.”

An official of a trading company in Changchun city remarked: “The recommendation of conferring the highest prize on Kimjongilia is not only high reputation to its profound meaning and beauty but also an expression of respect and expectation

for and boundless faith of all the people in General Kim Jong Il, I think.”

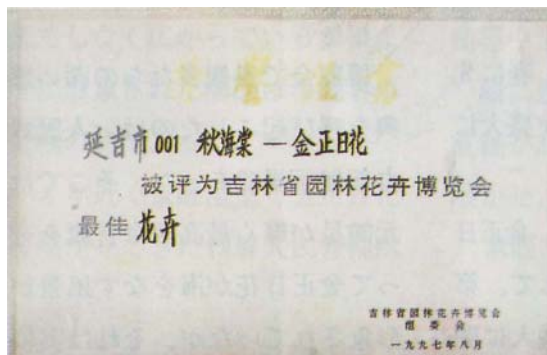
After making inspection of the fair, Mr. Ri who lives in Kyodong Sub-County, Kanghwa County, Kyonggi Province of south Korea said, “North Korea shows better thousand times the mettle of Koguryo which had remained a powerful state for a thousand years. The day of unification is not long when

Kimjongilia show will be held in Seoul, too, I think.”

The organizing committee of the flower show awarded Kimjongilia the best prize according to the unanimous will of examiners and visitors and the number of diploma is 001.



Rose



The diploma of the first prize awarded to Kimjongilia at the Jilin Provincial Flower Show in China

THE COLOUR OF FLOWER

It is the colour given to corolla or sepal by the plant pigment. The flower colour depends on the kind, quantity and chemical reaction of anthocyan dissolved in the cell sap. The colour of flower is also manifested by chromosome in cytoplasm. For example, the blue, red and dark purple colour of cornflower is caused by cyanin, the red colour of fish geranium by pelargonin, the red colour of rose, mainly by cyanin and pelargonin.

The red colour caused by anthocyan turns blue or bluish purple by alkali. The yellow flower becomes deep chestnut or purplish red by alkali. The yellow colour of flower caused by chromosome does not change by alkali. Production of anthocyan depends on temperature, light, nitrogen, phosphor and others and its kind and quantity produced in the same plant change. It also depends on the pH of the cell sap.

FLOWER SHOW HELD EVERY YEAR

February is not a thawing season. There is no precedent of holding a grand flower show in such cold winter, but since Juche 86 (1997) the Kimjongilia show has been held in a grand way.

On the occasion of the 55th anniversary of the birth of General Kim Jong Il the first Kimjongilia show was held at the Pyongyang International House of Culture.

More than 800 Kimjongilia pots presented by many units of the capital and local areas and army and working people were exhibited showing boundless adoration for and loyalty to respected Kim Jong Il.

In the exhibition hall of the Central Botanical Garden a figure "55" was made with 216 Kimjongilia pots in celebration of the 55th birthday of the General; in the exhibition hall of Ryanggang Province were in full bloom Kimjongilias which were cultivated by twelve counties of the province.

The exhibition arranged by

the Ministry of the People's Armed Forces left deep impression on visitors. It was characterized by numerous plants of Kimjongilia encircling the supreme commander flag with a Marshal star in the centre. Kimjongilias which the officers and men of the People's Army of sentry posts on the Demarcation Line and remote islets bloomed with their sincere heart, a decoration stand describing a turtle and sunflowers, a granite pedestal with a white bear engraved on its surface which supports the Kimjongilia pot, a black serpentine flowerpot, elaborate gemcraft works which represents Kimjongilia and other graceful decorations... those are permeated with the unanimous heart and steady faith of the People's Army men ready to defend the command of revolution at the cost of their lives and wish the respected General long life in good health.

The exhibition organized by the Ministry of Public Security is of peculiarity with

flowerpots made of famous Korean celadon and white granite and ceramic flowerpots on which slogan-bearing trees are drawn. The arrangement of two-faced mirrors surrounding Kimjongilia gives the impression of a garden stretching far beyond; a display that attracted the visitors' attention.

Through painstaking efforts and research, Han Sun Chol, officer of the Korean People's Security Forces, who has grown Kimjongilia for six years at the greenhouse built by himself, invented a device making it possible to grow Kimjongilia in all parts of our country.

Om Sun, workteam leader of the Rangnim Forestry Station in Jagang Province, managed to have ten Kimjongilias in his native place 1,300 metres above sea level where winter temperature is 30-40°C below zero, and presented them to the show; Kim ThaeK Yong, teacher at the Ryongho Senior Middle School in Kimchaek city, along with his wife, grew a large flower of 25 centimetres in diameter and sent it to the show.

Jong Won Yong, sub-workteam leader of the Songjong Cooperative Farm of Tanchon city, built a greenhouse with a plot of 30 square metres near his house and

Bills advertising Kimjongilia



INFLORESCENCE

The arrangement of flowers on the axis is called inflorescence.

Some plants bear single flowers but many plants have branched flower stalks or lateral branched stalks on which many flowers bloom congregated.

Flowers adhere to the flower stalks directly or by peduncles. The mode of adherence of flower stalks to the stem differs according to plants. The peduncle of flower corresponds to a branch and comes forth from the bract of leaf.

Inflorescence is divided into the indeterminate inflorescence and the determinate inflorescence.

1) The indeterminate inflorescence: As the tip of the flower stalk continues to grow, the flower which came out first is in the lower part. The flowers bloom consecutively going upward or centripetally. As the primary floral axis branches in the indeterminate inflorescence, flowers continue to come forth with the elongation of floral axes.

The indeterminate inflorescence is divided into simple inflorescence in which flowers come forth along the primary floral axis and compound inflorescence in which flowers bloom along the primary, secondary and other branches of the floral axis.

Simple inflorescence is divided into

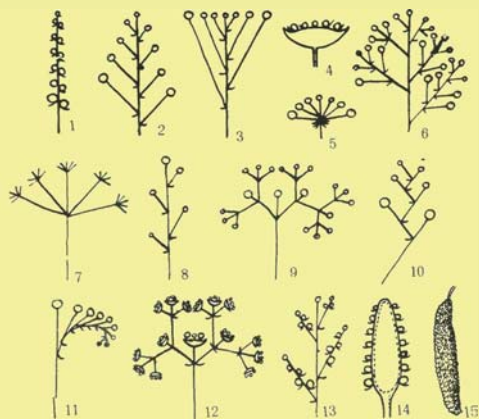
raceme (radish, cabbage, shepherd's purse and others), spike (plantain, wheat, barley and others), spadix (*Arisaema japonicum*, maize and others), catkin (willow, chestnut tree, *Actinidia arguta* and others), corymb (cherry tree, pear tree and others), umbel (*Acanthopanax sessiliflorus*, ginseng and others) and capitulum (sunflower and dandelion), according to its form.

Compound indeterminate inflorescence is divided into spike (rice, grape and others), compound umbel (carrot and others) and others.

2) The determinate inflorescence: As the primary axis ends in a flower, the axis grows no more. As in the determinate inflorescence lateral axes arise, the primary axis ends in a flower and one or several lateral branches which shoot out below the primary axis all end in a flower. The flower grows downwards or centrifugally.

The determinate inflorescence is divided into uniparous cyme (helicoid cyme and scorpioid cyme), dichasium (China pink and others) and polychasium (*Euphorbia pekinensis* and others).

Inflorescence evolved from raceme to spadix and then to capitulum through spike. On the other hand, raceme is considered to have evolved to corymb and umbel respectively.



Types of Inflorescences

1. spike 2. raceme 3. corymb 4. capitulum
5. umbel 6. compound raceme 7. compound umbel
8. uniparous inflorescence 9. biparous inflorescence 10. scorpioid cyme
11. helicoid cyme 12. compound capitulum
13. raceme of spike 14. spadix
15. catkin

together with his mother, wife, son and daughter cultivated more than 5,000 Kimjongilias and supplied them to others. Seventy-six-year-old Ko Sa Gyun who lives in Yonhap-ri, Unsan County and pupils of Pulgungori Primary School in Pyongyang though coming from different parts of the country were successful in obtaining blooming Kimjongilias defying bitter cold and heavy snow, with loyalty to the respected General. They exhibited them on the show, too.

Visitors were greatly interested in Kimjongilias sent to the show from abroad crossing oceans and continents.

The Kimjongilia pots which were sent by the Kimjongilia Hothouse in Yanji city of China, Kamo Mototeru, director of the Fuji International Flower Garden in Japan, Ri Thae Ryong, a Korean compatriot who lives in Shizuoka Prefecture are permeated with the boundless adoration of all people for the great man of the century.

During the show, functionaries of the Party and government, anti-Japanese revolutionary fighters, key officials of the Party and government, administrative organs, public organizations, central and secondary organs, officers and men of the People's Army, public security workers, workers, farmers, intellectuals, youth and students, children and other broad sections of people, expatriates and foreigners visited the show. Their number was over 100,000.

An anti-Japanese revolutionary fighter visiting the show said, "Seeing Kimjongilia, I can picture the appearance of our General vividly in my mind's eye. I come to have confidence. I think that our General must live long without fail. The first anti-Japanese generation, though old, will help him in work sincerely, staying near him." A delegate of the National Democratic Front of South Korea said: "This Kimjongilia exhibition hall is overbrimming with sincerity, loyalty and filial piety of the brothers and sisters of north Korea to the respected General."

Returning to his unit after seeing the show, an officer of the Korean People's Army expressed his resolution: "We, lifeguards, will grow Kimjongilia, the immortal flower, with great care so that Kimjongilia, which is our conscience and symbol of loyalty, would bloom more beautifully in all sentry posts where our soldiers serve."

The response of overseas Koreans and foreigners to the show is also wonderful.

Overseas Koreans, visiting-groups and foreigners staying in Korea as well as members of foreign diplomatic missions in Korea visited the show. They said that they were impressed by the show describing it as expressive of the mettle of the Korean people, single-heartedly united around General Kim Jong Il.

Hong Ryong Wol, head of the Kungangsan Opera Troupe, said: "Really wonderful show. Having heard

the news about the opening of a flower show, I supposed a few flowerpots would be displayed.

“I think it is by all means necessary to hold such exhibition in Japan, too. I also will do my best.”

Ri Su Ja, Yun I Sang’s wife, who is resident in Germany said: “I travelled a lot in the world, but it is for the first time I see such a wonderful show. I think that, thanks to having General Kim Jong Il in high esteem,

this splendid exhibition was held.”

Yurikov, a delegate of the Fisheries Commission of Russia, remarked: “Generally, a flower show is held in spring or summer or autumn. It is common knowledge. At the sight of the winter flower show I can see how fervent the loyalty of the people to their leader is.”

A great many visitors wrote their impressions in the visitors’ book.

—“Kimjongilia, one and

FLOWERING MEDICINAL PLANTS

Flowering medicinal plants are plants whose flowers are used as Koryo medicine. The flowers of *Typha orientalis*, peach, wild pansy, safflower, *Chrysanthemum cinerariaefolium*, *Daphne genkwa*, *Dianthus chinensis*, *Tilia amurensis*, *Rosa rugosa*, *Sophora japonica*, acacia, *Convallaria keiskei*, *Lonicera japonica*, maize hair and flower buds of *Magnolia kobus* are used as medicine.

The nectary which is often found in ovary, at the bottom of petal or on the protuberances of sepal secretes nectar or essence.

When a flower is used as medicine, it is picked when it is in full bloom (*Chrysanthemum cinerariaefolium* and *Carthamus tinctorius*) or in the stage of flower bud (*Viscum coloratum*, *Artemisia maritima*, *Sophora japonica* and others). Petals (*Matricaria chamomilla*, *Chrysanthemum cinerariaefolium*, *Inula japonica* and others),

corolla (*Carthamus tinctorius*) or pistils (or maize hair) alone are picked for medicine.

Flowers for medicine are to be picked in fine days and dried, spread in a well-ventilated place.

Peach blossoms



only flower in the world, is like a spring day to be everlasting and immortal.”

Yun Jae Suk, a Korean from China

–“This is the most beautiful flower, unprecedented on the globe and is symbolic of the sun.”

Ahumad Huadmadui, a Palestinian student studying in Korea

–“Through my visit to the show, I knew well how sincerely the Korean people respect their leader. That the Korean people extend so warm congratulations to their leader on the occasion of his birthday is the expression of their whole-hearted belief in his devoted efforts for the country’s prosperity and progress, I think.”

Ahumad El Sayed, a diplomat

of the embassy of the Arab Republic of Egypt

–“Each flower exhibited in the hall is the crystallization of the spirit of the Korean people to build up a prosperous and happy country, win ultimate victory in the socialist construction and thus realize national reunification.

“The great leader Comrade Kim Jong Il is the guiding sun whom the Korean people and all the people of the world look up to.

“We, therefore, are sure of victory in accomplishing the cause of the Korean people.”

Oscar Gender Pernandes, attache at the embassy of the Republic of Cuba in Korea

–Be in full bloom forever, Kimjongilia!

Flower shedding a light on

**Artistes of different countries singing *Let Kimjongilia*
*Be in Full Bloom over the World***



the Korean people

*Flower making millions of
offsprings happy*

*Flower, splendidly arranged by
the strength of love, beauty and
ardor of the Korean people...*

Jordan

Mupachiyev,

ambassador of the Republic of
Bulgaria in Korea

In response to the unanimous
will of all visitors the Kimjongilia
show will be held in February
every year as a flower festival.

The First International Kimjongilia Show



KOREAN KIMJONGILIA FEDERATION

In June of Juche 84 (1995) the Korean Kimjongilia Federation was organized in Pyongyang.

The federation encourages the propagation, supply and distribution of Kimjongilia through establishing contacts with all organs, enterprises, cooperative farms and other units which cultivate the flower.

Its main efforts are directed to the successful organization of Kimjongilia shows every year. It also establishes contacts with institutions wishing to participate in the show, gives them technical aid to grow Kimjongilia and takes measure to provide them with seedlings. At the same time the federation deals with practical problems related to the preparation of flower shows.

With a view to popularizing the knowledge of culturing Kimjongilia, the federation publishes technical books on its cultivation and organizes meetings to exchange information on its cultivation and propagation.

The federation sends Kimjongilia to foreign gardeners and lovers of flower, conducts exchanges with them and has close cooperation with regional association such as the North European Kimjongilia Association and the Mongolian Kimjongilia Association.

It promotes the building of Kimjongilia hothouses in different countries and the organization of Kimjongilia shows and conducts foreign exchange in connection with this.

The Korean Kimjongilia Federation has an Exhibition and Technique-Propagating Section and Foreign Affairs Section. The chairman of the federation is Jang Chol, Vice-Premier of the Administration Council.

The federation office is located in the Pyongyang International House of Culture in Ryonhwa-second Dong, Central District, Pyongyang City.

BEAUTIFUL FLOWERING



**– TEXT OF A LECTURE GIVEN BY DR. KIM IN GI ON
GROWING AND PROPAGATING THE FLOWER –**

UNCHANGED HABITS

The Andes species of tuberous begonia, the original pure breeds of Kimjongilia, have grown in highland of 2,000-3,000 metres above sea level.

The climate of such tropical or subtropical mountainous regions is not so hot nor so cold: temperature in the daytime is less than 25°C and night temperature does not fall below 7°C.

Of these mountainous regions, the tuberous begonia grew in places, not too long exposed to direct sunlight and with comparatively high percentage of atmospheric humidity.

Therefore the Andes species are adapted to such climatic conditions.

For one hundred and scores of years since the latter half of the 19th century, floriculturists carried these wild species to Europe and tried crossbreeding to develop them into larger and more beautiful flowers. As a result, today's modern species of tuberous begonia, incomparatively larger and more beautiful than wild pure breeds were born.

Kimjongilia is an outstanding, modern species among such tuberous begonias. However, its ecological environment such as temperature, moisture, light and soil conditions is almost the same as those of the Andes species.

Temperature Condition:

Temperature is the main ecological condition for plant living.

Therefore the sphere of geographical distribution of plants depends mainly on temperature conditions. Generally, flowering plants are classified into three categories according to the temperature condition suitable to their growing. The flowering plants proper to 25-30°C are called high-temperature flower plants, those suitable to 15-25°C, moderate-temperature flower plants and those agreeable to 10-15°C, low-temperature flower plants.

Kimjongilia belongs to the moderate-temperature flower plants. So it grows well in the area of 15-25°C or in a greenhouse with this temperature condition.

But it grows poorly in the condition of higher or lower temperature than this. The continuation of over 20°C at night and over 30°C in the daytime hinders growing. In the condition of this high temperature the growing point spoils, leaves are curled back and flower buds fall down. If temperature of less than 10°C at night lasts, the plant does not grow; if the 5-6°C temperature at night stands long, plant tissue is spoiled, and at the temperature of below zero it is frozen. However, during cultivation temporary drop of temperature

to 7°C does not harm the plant. It retains the habit of the Andes pure breeds.

The proper temperature conditions of *Kimjongilia* differ little by little according to its growing steps.

At the time of growing-up and blooming, it is good to keep a difference in temperature between day and night of over 10°C. In case of comparatively high, summer daytime temperature if night temperature is low, there is no great damage to the plant.

Humidity Condition: Moisture is an important ecological

Proper Temperature According to the Stages of Growth

Stages of Growth	Proper Temperature (°C)	
	Temperature in the Daytime	Temperature at Night
Period of Young Seedling	20~22	16~18
Period of Moderate Seedling	20~22	15~16
Period of Blooming	18~20	12~15
Period of Preparation for Rest	18~20	7~10
Period of Rest	4~5	4~5

FLOWER VEGETABLES

Calyxes, flowers, flower stalks and flower buds serve as edible vegetables. Cauliflower, rape, wall flower, *Zingiber mioga*, *Cirsium maackii*, *Abelmoschus esculentus*, gymmit, edible lily and others serve as flower vegetables.

As for cauliflower, its constricted calyxes which store plenty of nutrients and are light milkish white are edible. As for *Cirsium maackii*, *Zingiber mioga* and edible lily, their well developed tubers are edible. As for rape, wall flower and gymmit, their soft flower stalks coming out from the upper part of the stem and flowers are edible.

Since olden times the Korean people have the custom of eating griddle cakes made of the flowers of azalea.

Unlike usual vegetables, flower vegetables are serviceable as vegetables

only when they are picked in right time. Method of their cultivation differs according to their use.

Cauliflower



condition for the growth of a plant. In the period of sprouting of seed saturated humidity is needed; in the period of nutrition-growth—the time of young seedling and the time of moderate seedling—humidity of 70-80% is proper, at the time of blooming and of preparation for rest, 60-70% and in the period of rest for tubers, 40% respectively.

Kimjongilia requires comparatively high percentage of atmospheric humidity, and moderate soil moisture condition where solid, liquid and gaseous elements are even. When soil moisture is too high or when soil is too dry, a flower plant grows poorly and might wither.

Light Condition: Generally, plants are divided into sunny plants and shady plants. Kimjongilia belongs to the latter. Therefore, it grows well in shade away from strong direct sunlight. Requirement for light differs a bit according to the stages of growth. In the period of the sprouting of seed, very dim light is required; at the time of young seedling, the light of 5,000-8,000 luxes and in the period of moderate seedling and blooming, 9,000-10,000 luxes.

To secure such light intensity in the season of intensive sunlight it is necessary to hang shades or reed-made blinds behind the glass walls exposed to sunlight.

The length of daytime is vital for the growth and bloom of

plants. Generally speaking, the plants which bloom in the long-daytime condition are called long-daytime plants, and those which are in bloom in the short-daytime condition, short-daytime plants. Kimjongilia is one of the long-daytime plants. Therefore its growth and blooming require about 14 hours of daytime. In the season or region where the span of daytime is shorter than this, additional light must be supplied at night to secure the required length of daytime. Supplementary light may be set on for about 2-4 hours after sunset or for 1-2 hours at night. Six hundred watt sodium electric lamps or 40 watt fluorescent lamps are usable for additional light. Fluorescent lamps can be installed 1.5 metres above the flower stand in intervals of 2-3 metres.

Soil Condition: Soil condition is one of ecological conditions which greatly affect the growth of plants.

Kimjongilia grows well in coarse humus soil. In the woods of tropic and subtropic high mountains humus layer is laid thick and it often rains, so moisture is enough. The ecological habit of the tuberous begonia bred from the Andes pure breeds which had been adapted to such conditions is nearly the same as that of the pure breeds.

GROWING FLOWER IN GREENHOUSE AND AT HOME

Cultivation in Greenhouse

Of tuberous begonias there are flower plants which grow at the flower bed outdoors. But Kimjongilia is usually cultivated in a greenhouse. To bloom Kimjongilia beautifully it is very

important to build a greenhouse properly, because the conditions of greenhouse are fundamental to the arrangement of good cultivation conditions. Therefore, floriculturists must know well about the characteristic features of various types of greenhouses and

The Kimjongilias which are brought in bloom in the hothouse



efficaciously use the micro-climate of their own greenhouse. Meanwhile, it is also advisable to arrange proper flowerpots and good culture soil, water and fertilize plants in a rational way.

Arrangement for Flowerpots and Culture Soil: As for flowerpots for cultivating *Kimjongilia*, ordinary pots can be used.



Earthenware pots are favourable for the growth of plants because earthenware is porous, so water is fully absorbed and air passes through. Therefore earthen pots are widely used as flowerpots for moderate seedlings and blooming flower. Plastic pots are used in growing young seedlings since they are light and convenient to handle. Ceramic pots are mainly used for exhibiting flowers because their surface is glossy and clean. Pots of various size are needed: 7-8, 12, 16, 19 and 25 centimetres in diameter. Pots must be washed well and then dried in the sun. They must be dipped in water first so that they could fully absorb water.

The principal components of culture soil are leaf mold, peat, sand, bermanite and perlite, which have properties of good drainage, preservation of moisture and passage of air. Coarse broad leaves which fell on the ground and got rotten for 2-3 years are used as leaf mold. Peat must be fragile, too. Coarse sand is fit. Leaf mold must be disinfected with heat of about 60-80°C. To do this the moist leaf mold is spread 5 centimetres thick on a heated iron sheet, and turned over 2-3 times with a spade. When vapor rises from the leaf mold it is piled up in one place, covered with a vinyl sheet and then kept under 50-60°C for 5-6 hours. If a small quantity of leaf mold is to be sterilized, it can be placed in a high-pressure steam sterilizer for about 15 minutes.

It is good to mix the elements of culture soil just before using it. The mixed culture soil must be preserved clean, preventing it from hardening and being mixed with filth. Culture soil should not be blended with various organic substances such as domestic animals' excrements and bean cakes which were not completely rotten. In the culture soil mixed with such foreign matters plant's root might decay as those matters are putrefied during its growth.

In case of making culture soil with leaf mold, peat, and sand, they are in the ratio 1:1:1 in volume.

Transplanting of Seedlings and Replacing of Flowerpots:

It is essential to replace *Kimjongilia* pots several times according to the stages of its growth from young seedling till before blooming. The root of *Kimjongilia* is typically a forked one which is laid in small depth and aerobic. So, only when the seedling is moved to other pots befitting to the extent of its growth, can it grow healthy and come into bloom.

Before changing pots it is necessary to have various kinds of garden tools ready at hand. For the universally usable tools there are a seedling box, water vessel, water sprayer, sieve, garden trowel, pincette, bamboo chopsticks, stand, strings and so on.

A seedling box is used when tissue culture seedlings are to be acclimatized or seedlings grown up from seeds are first to be transplanted, when tubers are sprouted or cuttings are planted. A box size of 60x40x10 cm is convenient to handle. A water vessel is useful to put a flowerpot or a young seedling box in it so that they can take in water from the bottom. The vessel can be made of an aluminium sheet or a galvanized iron plate or concrete, large enough to accommodate 2-6 seedling boxes at one time.

Sieves of two or five millimetres wide eyes are mainly used. It is desirable to have both a sprayer with a minute-hole nozzle and another with a

little large-hole nozzle. The former is for watering young seedlings and the latter is for watering a little taller plants.

To change flowerpots, it is advisable to spray water over culture soil until it is damp. If exceedingly moist culture soil or dry one is used, roots may be damaged or water may not penetrate into the soil evenly after planting seedlings.

As a seedling grows up in a box as large as its leaves lie one upon another, first it must be transplanted in a pot of 7-9 centimetres across. When the seedling is transplanted in a small pot, its leaves must cover the pot by 60 percent and if the pot is too large in comparison with the seedling, the seedling grows up poorly. It is desirable to plant the seedling in the centre of the pot, the end of leaf projected a little outside the rim of the pot.

At this time the lower part of leafstalk must not be buried in the culture soil, and, in particular, care should be taken lest growing point should be buried in culture soil. On the other hand if a seedling is planted in too shallow soil, its roots may be broken as it moves.

When the seedling grows up about one month after the first transplantation the leaves spread out of the pot. Then it must be transplanted to the other pot of 13-16 centimetres across. In such a way pots are changed several times until

blooming: in case of propagation by seed, 4-5 times; tissue culture seedling, 3-4 times; the seedling propagated by cuttings and seedlings grown from tubers, 2-3 times.

When replacing a pot one pushes upward its bottom hole with one's finger, pulling out the plant. A piece of a broken pot or gravel or slag is placed on the bottom of the new pot to be changed, some culture soil spread above it devoid of the seedling as it is and then the space between the pot and culture soil block filled up with culture soil up to one centimetre beneath the pot rim. The surface of culture soil must be levelled with that of the former culture soil block. It is advisable to water the plant half a day after changing the pot.

Watering: It is important to preserve the state of solid, liquid and gas in the culture soil of flowerpot to be in the ratio 1:1:1. Only then can the root take in water sufficiently, breathing freely.

To do this a modern greenhouse is furnished with automatic watering devices, laid with vinyl pipes leading to each flowerpot and installed regulator-valves to drop water, so that the proper moisture is kept. In the greenhouse which is not equipped with such devices watering cans are used. When the culture soil dries one centimetre deep enough water must be sprayed on the pot at 10 a. m. till it starts dripping from the bottom hole of the flowerpot. Since the *Kimjongilia*'s roots are struck in the

shallow layer of culture soil, attention must be paid lest the culture soil be dug by water.

The following watering must be done after the culture soil dries one centimetre deep. If not, the root can hardly breathe and rot because of increased moisture in culture soil and lack of air. On cloudy or raining days watering must be avoided. In particular, in rainy season only dry flowerpots must be watered.

Fertilization: *Kimjongilia* is keenly sensitive to fertilizing.

Proper fertilizing is helpful to blooming large and fine flower, and the applying of excessive quantity of fertilizer hinders the growth of flower. When fertilizing the culture soil of a flowerpot, many kinds of fertilizers of different density must be mixed according to the steps of growth of seedlings. Prescription for mixed solution of inorganic fertilizers made in consideration of the absorption quota of nutritious elements by the periods of growth of *Kimjongilia* is as follows:

To manufacture culture solution one must first make individual fertilizer solutions separately by the kinds of fertilizer, mix them and add water to them until total volume of solution comes to 10 litres. In this culture solution the density of inorganic salt comes to about 0.2 percent. Fertilizer solution may be spread once every 7-10 days or two or three times a week by reducing

**Prescription for Mixed
Solution of Three Major
Fertilizers g/10 ℓ**

Kinds of fertilizer Period of growth	Ammonium sulphate	Superphosphate of lime	Potassium chloride
Period of growth by nutriment	13.0	3.3	3.3
Period of reproductive growth	10.3	7.2	2.5

its density with water to 1/2 or 1/4 simultaneously with watering.

As for organic manure, one dissolves two spoonfuls of completely rotten chicken droppings in a bucketful of water and spreads it on the flowerpots once every 7-10 days. Manuring can be first applied once in the interval of seven days and then of ten days alternatively or manure of reduced density be given.

It is also advisable to fertilize a week after changing a flowerpot when root's absorption ability becomes sufficient.

In the period of young seedlings it is desirable to spread 0.1% ammonium sulphate solution on the leaves as additional fertilizer 3-4 times in the interval of 7 days. This helps the leaves to become large, stems to thicken and seedlings to grow quickly, so that large flowers can come into bloom. Boric acid solution of 0.025% and copper sulphate solution of 0.05% are effective leaf-additional fertilizers,

which enhance resistance of the plant to heat.

Growing the Flower at Home

To grow Kimjongilia at home it is imperative to know how to use effectively the seasonal conditions of one's local area and the microclimatic state of one's room. In the temperate regions where four seasons are distinct from each other, in the season when atmospheric temperature is 15-25°C Kimjongilia can be cultivated at the verandah or outdoors and in the season where atmospheric temperature is higher than 25°C or below 15°C, be grown in the room furnished with an air-conditioner. To grow it in the verandah in the summer, the

Kimjongilia in full bloom at home



suitable place is where in the morning the sun shines for 3-5 hours and afterwards diffused sunrays are shed on. So a verandah facing east or southeast or northeast is proper. In case of growing it in a verandah facing south or west, it is desirable to lay the Kimjongilia pot beneath the tall ornamental plant such as a rubber tree or some grown-up tree. A north verandah, not exposed to direct sunlight, does not need to have shading plants. The flower can be grown at the north verandah, too, but it does not grow tall because of less sunlight. In a verandah where Kimjongilia is grown it is necessary to create a microclimatic state so that the place is not so exceedingly dry by growing various ornamental plants together and putting fish globes. Also it is advisable to put sphagna near the flowerpots and water them.

In winter when growing Kimjongilia in the room attention must be given to the following:

First, since the difference in room temperature between day and night is not as significant as outdoors one must see to it that temperature of the room should not rise too high and that difference in temperature between day and night becomes 5-6°C at least. For this purpose, the flowerpot can be moved at night to the toilet where temperature is low.

Secondly, the season of growing Kimjongilia in the room is as a whole winter in the temperate

regions when daytime is short. Therefore, additional light is needed to fill up the 14 day-hours. A living room is usually provided with supplementary light because one watches TV in the evening and has the lights on, but an office room needs supplementary light for 2-5 hours because it is vacant after 8-hour work. The supplementary light can be set on by a time-limit relay or instruction can be given to a guard to turn on the lights at the desired time.

Thirdly, room moisture may be considerably less than that of a greenhouse. So, it is advisable to widen the surface of evaporation of water by growing many ornamental plants such as a rubber tree and grown-up tree and placing a fish globe and spreading gravel or sphagna on a broad tray full of water.

As mentioned above, steps to increase moisture are helpful to the growth of Kimjongilia. In a room with a south window, its

**They are tending the flowers
with all sincerity**



temperature may rise up while moisture may be reduced because of strong sunlight entering through the window, so it is favorable to draw a thin curtain on the window.

It is also important to strengthen the plant body so that it becomes adapted to the home environment.

If a flowerpot brought directly from a greenhouse is placed in the room, the flower droops within a short period of time, because of sudden change of environment. To bloom the flower at home, one must cultivate the seedling, devoid of bud, at home while gradually adapting it to the home conditions.

This is one of the secrets of blooming flowers at home. Watering must be done in a proper way. Particularly, the flowerpot must not remain wet all the time by frequent watering. It is also advisable to use tap water which is kept overnight rather than using fresh tap water. If in the summer when the temperature rises up zinc sulfate solution of 0.5% or rare-earth element manure solution of 0.03% is sprayed on the leaves once or twice a month, the plant's resistance to heat increases.

In the summer when temperature is over 30°C in the daytime and over 20°C at night, it is difficult to grow the flower in a room without an air-conditioner. In such case it is recommended that one should make tubers form in

early days and keep them in a refrigerator and that as weather gets cool one should sprout them to cultivate.

As aforesaid, if seasonal conditions are taken into consideration according to local regions, Kimjongilia can bloom at home, too.

Preparation of Flowers for the Show

Flower shows are opened on various scales in many countries and regions of the world. Through the show information on success and experience obtained in breeding and growing the flower plant is presented, exchanged and disseminated. Therefore, flower shows are always held when floriculturists and flower-lovers make painstaking efforts to put the best flowers on display.

To exhibit beautiful Kimjongilia it is essential, first of all, to synchronize its full blooming with the date of the show.

There are some differences in blooming time according to the state of seedlings, cultivation conditions, and the method of administration. Generally, seedlings bred from seeds bloom in about 170 days, tissue culture seedlings, in about 150 days and seedlings propagated by the method of planting cutting, in about 130 days. Therefore, one must prepare seedlings in consideration of these spans of time till blooming.

It is advisable to plant flowers by stages about one month ahead

of the scheduled date of blooming because all flowers are not in full bloom altogether due to different factors even though they were planted, timing the period of blooming. Only then, can one bloom more flowers during the show.

Besides, one can anticipate the period from the time of bearing a bud to its full bloom by the help of the following table:

Using the table, one can see that in order to make flower come out in full bloom on January 1, the flower bud must be as large as about two centimetres across in late November. Of course it cannot be said that the figures on the table can be

applied to anywhere as they are in accordance with the state of plant, conditions of greenhouse and seasons. That is why it is necessary to know the expected date of blooming, suitable to the conditions of the greenhouse.

To have a large flower it is imperative to cut out all the lateral sprouts coming out of the bottom of stem or from the bracts of leaves. Two months ahead of the flower show, one cuts all the flower buds born at first, because flower buds bloom in 40-50 days after their birth and those which came into bloom two months prior to the show opening may bloom ahead of the scheduled date of the show.

Size of Flower Bud and Mean Days till the Full Bloom of Flower

Size of bud (cm)	4.5	4	3	2	1	0.5
Number of days	18	20	25	30	35	40



One month before the show opening all flower buds, big or small, are all cut off but one which is 2-3 centimetres across, because the buds smaller than this do not bloom during the show and bigger ones bloom far before the show. If necessary, one more flower bud which is a little smaller than the original may be left on the plant.

Observing the flower buds growing, if one of them is wanted to grow up bigger, the gardener plucks the other; if both buds are needed to be exhibited, he leaves them as they are.

When it is expected that flowers would come into bloom much later than the show period, the gardener cuts all flower buds, leaving the first one and, if necessary, plucks the female flower which was kept in reserve, too. Thanks to such measures all nutriments are concentrated on one bud only, whereas the period of blooming may be brought forward by ten days.

The period to prepare flowers and the method of plucking buds must be decided by floriculturists themselves taking into consideration their own situation. That is because meteorological and climatic conditions vary from region to region. So do greenhouse conditions and seedling state.

For this reason it is necessary for a floriculturist to cultivate the flowers in his own greenhouse during one cycle of flower-growing, accumulating experiences and

investigating cultivation methods.

To participate in the show flower must be transported to the show place safely. For the purpose of this, flower-petals, which are apt to touch leaves, must be wrapped with sanitary cotton. It is also advisable to arrange other auxiliary flowers as well as Kimjongilia. The auxiliary flowers can add more grace to Kimjongilia and promote formative effects of the show.

As for auxiliary flowers, flowers of lineage of lighter colour than Kimjongilia—white colour in main—can be chosen. It is also good to add various kinds of ornamental plants to the show. As a Korean proverb “With care a flower can come to bloom on a rock” goes, if everyone puts his whole mind to growing Kimjongilia, he can bloom fine flowers to be presented at the show.

Blights Must Be Prevented in Advance

Clumsy watering and nutritive administration and bad cultivation conditions can make plants weak and possibly sick. Kimjongilia may wither by various harmful insects when moisture at night increases by over 95 percent, when agricultural chemicals are not applied in time, when agricultural chemicals of the same kind are overused and when gardening tools are not sterilized in the course of planting cuttings and growing flowers.

Mosaic disease: When the flower

plant is attacked by this disease, its leaves get light green and gradually dark maroon and roll back. The disease is caused by a virus. If the disease is to be prevented, it is imperative to cultivate a healthy plant and dispose of the affected ones in time.

Stem-rot disease: This disease is caused by poor ventilation due to close location of flowerpots or by high atmospheric moisture during rainy seasons. At first maroon mottles are seen on the stem and then gradually diffused, while stem rots. A gardener cuts out the rotten part and sprays sulphur powder on it. In the early stage of disease 0.4% Bordeaux mixture and 1/400 zineb solution are sprayed 2-3 times for an interval of a week. If serious, that plant must be removed and the flowerpot and culture soil be disinfected with heat.

Dust louse: This is an invisible harmful insect. It sticks fast to the third leaf from the shoot and flower bud and sucks sap. The flower and bud, which are infested by this insect, turn gray-white or gray-chestnut and, in the long run, are lignified. In many cases the blighted bud does not bloom. In the early days of appearance of insects the 0.2-0.4 degree compound solution of lime and sulphur, compound of 1/400-1/800 sulphur and hydrate solution, 1/800 nubaclon solution and 1/1,500 neonon solution are sprinkled 3-4 times for an interval of 3-4 days.

The solution of mixture of *Botrychium ternatum*, tobacco and *pyrethrum* is also efficacious against the blight.

Slips: This insect often appears at high temperatures in summer. It is a small yellowish insect, one millimetre in length. The damaged leaves, on which white mottles are seen, turn maroon and curl up. On the flower appear a lot of gray mottles, so it is poor-looking. Nicotine sulphate, 1/800-1/1,000 diazinon, compound solution of *Botrychium ternatum*, *pyrethrum* and tobacco mixed with potash chloride of 0.1%, are sprayed 3-4 times for an interval of 4-5 days.

Nematode: This insect holes into tissue to do harm to the plant and is characteristic of making knobs in that part. There are about ten nematodes in one knob.

The damaged plant withers and dries gradually because many pabulas arise in roots and hair roots do not drive in soil. To prevent damage it is necessary to disinfect culture soil thoroughly. At the same time 1-3 grammes of DBCP oil is applied to each flowerpot. For the purpose of disinfection the blighted small tubers are soaked in water of 25-30°C and the temperature of the water is brought up slowly to 48°C and then kept in the water for five minutes. As regards blighted large tubers, they are dipped in the water of 45°C for 40 minutes.

DIFFERENT WAYS OF PROPAGATION

All plants on the globe propagate in different ways for their posterity. Some propagate by seeds, some, by planting bud sticks and others, by tubers.

Kimjongilia increases through these methods and by tissue culture, too. There are few plants which are propagated by all these methods. Now that Kimjongilia can be propagated through various methods, it can spread fast.

A Small Seed Blooms A Large Flower

The Kimjongilia's seed is very small, but the flower born from it is particularly large. Generally, when the flower plants, which are reproduced by vegetative organs, are propagated by seeds, the features of species concerned are hardly maintained as they are. As regards Kimjongilia,



the vegetative reproduction method is applied to it while species can be preserved the way the individual plants showing the characteristic features of the species are selected after the plants which were reproduced by seeds came into bloom. This is also the main ways and means to preserve the species.

Selection of Seeds: In order to select seeds one must choose good male and female plants and crossbreed them. For a male plant, one must choose a plant of polypetalous quality, preserving the prototype of the round shape and use the pollen produced from it. In this case few seeds are gathered, but one can obtain polypetalous plants of over 80 % which have such form and quality as those of the female plant. However, if the pollen of gamopetalous male flower is used simply because it is easy to obtain, such plants as those of the original form can hardly be bred. However, a polypetalous flower seldom bears pollen. Therefore, it is imperative to create such unfavourable circumstances and malnutrition conditions that stamens can be born from the polypetalous flower which was selected as a male plant. Owing to its original nature to leave its offspring behind a plant makes pollen if a bad condition was created for it.

To do so it is advisable to lower temperature a little, spray less water and apply fertilizer

solution of half-reduced density or do not at all.

Under this administration, the plant which blooms early does not bear pollen, but the one which blooms lately can do so.

If in the blooming time one cuts the stem half and cultivates lateral branches coming out of the lower part of the stem and leaf bract, the flower may bloom and bear pollen.

As a female plant one must select the matrix of Kimjongilia or a plant reproduced with the vegetative part of the matrix. After the parental plants were chosen in this way the gardener coats a soft brush with pollen as pollen blows from the pollen sac of a stamen, carries it closely to the head of a pistil and flicks it off the brush to pollinate the flower. Thirty to forty days after pollination seeds are born. After gathering seeds the gardener puts them in the room until full ripeness and then flips them before assorting. He puts the seeds in an envelop and keeps them in a refrigerator under 4-5°C. The seeds have the sprouting ability even after two and half years.

Sowing of Seeds: It is proper to sow seeds in a flowerpot of 13

Collection of flower pollen grains



centimetres across. One sifts humus mold, peat and sand separately to get granules of 2-5 millimetres in diameter and less than 2 millimetres in diameter, and sterilizes them in a steam boiler for 15 minutes. And then one mixes them in the ratio of 1:1:1. At the time one must mingle coarse and fine granules separately. As flowerpots and culture soil are arranged to sow seeds, first of all, the bottom hole of the pot must be blocked, the pot filled with fragments of broken pot or wet sphagna up to the third of the height of the flowerpot and coarse culture soil put at first and then fine one. And the pot is shaken so that the surface of culture soil is lowered about one centimetre beneath the pot rim and then levelled. Next, the flowerpot is soaked in a water vessel as deep as two thirds of its height so that the culture soil absorbs water from the bottom. After the seeds are put on a sheet of thick slick paper the corner of the sheet is lightly tapped to let the seeds roll down evenly to the culture soil.

Fifteen to sixteen seeds are sown per one square centimetre. A flowerpot of 13 centimetres across accommodates 300-400 seeds.

After sowing a sheet of glass is placed over the pot and it is



covered with a sheet of paper so as to secure half dark condition (about 100 luxes).

The pot must be provided with constant temperature of 20°C. Three to four days after sowing the depth of water is controlled so that the pot is immersed in water as deep as 2-4 centimetres.

When seedlings grow 3-4 millimetres high and bud leaves become green the pot should be taken out of the water vessel

The method of immersing the recently sown flowerpots in a water box



and soaked in the water vessel every several days for the purpose of having it absorb water.

Ten to twelve days later the shading paper on the flowerpot should be removed.

From 18-20 days since the sowing the air must often be ventilated. As leaves grow one centimetre large and become green, the glass lid is opened half way. A week before transplanting seedlings the glass lid must be removed.

Transplanting of Seedlings:

Seedlings grown in the seedling bed must be transplanted in a box temporarily. Temporary transplantation must be done at the time of bud leaf before original leaves come out. If transplanting of seedlings is carried on after leaves appeared, seedlings may get damaged when they are pulled out because their roots branch into three or four parts. A box of 60 x 40 x 10 centimetres is suitable. A layer of fine gravel or pieces of the broken pot and coarse culture soil are put on it and then 0.5 centimetre thick fine culture soil is spread. The culture soil must be filled up to 1.5 centimetres beneath the height of box. It is necessary to

immerse the seedling box in a larger water container so that water permeates the box. One transplants seedlings when the upper layer of culture soil is fully wet. The seedlings grown in a flowerpot, too, must be pulled out after water is fully absorbed in culture soil by submerging the pot in the water container.

Prior to transplanting seedlings in the box, a hole is made on the humus mold in the intervals of 2.5 centimetres, a seedling taken from the flowerpot with chopsticks put on one side of the hole and then the culture soil on the other side of the



The flower seedlings after secondary transplanting

The flower seedlings after tertiary transplanting



Flower seedlings after primary transplanting



hole pressed on it so that its root is buried in culture soil.

As transplanting is over, the box is soaked again in the water container so as to let it draw in water from its bottom. And then the box is placed in the shade where temperature is 18-25°C and atmospheric moisture is 70-80 percent. A week later it is placed in a half-shady place under 5,000 luxes. At first the seedling box is watered by submerging it in the water container and then a sprayer is used as original leaves grow one centimetre broad.

After 30-40 days, the seedlings in the box grow large enough for their leaves to touch each other. Then the flowerpot must be replaced with another one of 7-9 centimetres across.

Planting of Cuttings

Generally, a plant has reviving ability, by virtue of its nature. When a certain part is separated from it, that part grows up to be a whole plant. Vegetative reproduction means a method of multiplying a plant with vegetative organs such as stems, bud sticks, leaves and roots, relying on the reviving ability.

In case of vegetative reproduction, like the planting of bud stick, the offsprings, which are hereditarily the same as their mother plants, are multiplied.

Preparation for Materials and Culture Media of the Flowerpot to Plant Cuttings:

Materials to plant cuttings are lateral bud sticks coming out from the lower part of a stem and from the bracts of the 1st-4th leaves, the upper part of main stem, sprouts germinating from a tuber and a leaf with a leafstalk. In case of using the lateral bud sticks coming out of the lower part of a stem and the bract of leaf, a lateral bud stick with two leaves and one-centimetre-long stem has high vitality. In order to obtain many lateral bud sticks it is necessary to cut the upper part of stem, leaving two lower leaves of a plant. When one cuts off a lateral sprout from the lower part of stem or from a bract of leaf if all lateral bud leaves except two are cut away, two bud leaves come out of the bracts of the remaining leaves, so a lot of lateral sprouts can be obtained. In case of using a leaf of the main

The method of cutting offshoots



stem as material, it is advisable to use a leaf of 7-9 centimetres in diameter grafted on the leafstalk of two centimetres long.

For culture media, coarse sand, pumice, sphagnum and humus mold must be prepared. A gardener puts in the wooden box pieces of broken pot, slag and gravel in the thickness of 2-3 centimetres and spreads coarse humus mold on them in the same thickness and then coarse sand above it in the thickness of 3-4 centimetres.

How to Plant Cuttings: It is favourable to plant cuttings when mean atmospheric temperature is 18-20°C and moisture is 60-70 percent. In the temperate regions spring and autumn are proper seasons.

At the time of planting cuttings one first fully waters the



Planted leaf cuttings

culture media and then plants cuttings in the intervals of 5-7 centimetres though some differ according to the materials for cuttings. (photo)

In case of a 3-4-centimetre-long leaf of a cutting, it is good to plant it 1.5 centimetres deep. After planting cuttings one must provide it with the light of 2,000-3,000 luxes by lowering double reed-blinds for about 10 days

and then remove one of them in order to secure the strength of light of about 5,000 luxes. Daytime of about 10 hours must be provided for 20 days after planting cuttings and afterwards more than 14 hours. After planting, a sprayer is used to sprinkle enough water for the planted cuttings to be glued to sand. From then onwards no excessive water is needed and it is good to sprinkle water over leaves frequently. After 20 days water is needed only whenever the surface layer of culture medium is a little dry.

At the time of planting cuttings flower buds which were born in the period of seedling in the box must be cut off. Forty days later the planted cuttings must be transplanted in flowerpots.

Transplanting of the Seedling Grown from the Planted Cuttings:

As a planted bud stick begins to strike root, leaves get dark-green and lateral eyes begin to grow. Meanwhile the main root strikes in the soil about 1.5-2 centimetres deep and 2-3 lateral roots come into being. This is the best time to transplant seedlings from the planted bud stick in flowerpots. If a seedling is transplanted when its root just begins to strike or when it grows too long turning maroon, the seedling grows poorly later.

At the time of transplanting seedlings it is important to handle them carefully lest their roots should be hurt.

The size of a flowerpot must

be fixed properly according to the size of the planted bud stick and the extent of rooting. The plant grown from the bud stick such as small leaf body, lateral sprout and so on must be transplanted in the flowerpot of 7-9 centimetres across; tall plant be replaced in the pot of 13-16 centimetres across. After transplantation of seedlings the flowerpots must be placed in the shade for a week and then gradually be shifted to a place with proper light condition. With the passage of about ten days after the transplantation of seedlings, fertilizer is applied. As the flowers of a plant, which is reproduced through the method of planting a bud stick, are somewhat small, it is advisable to bring the third flower bud into bloom, while cutting off the first and second buds.

Over 15 Years with Tuberous Roots

Quite a few flowering plants propagate by rounded thick roots. They mean the rounded roots which are formed underground. They are divided into corm, rhi-

zome, tuber and bulb according to the part of the plant in which they are formed and to their form. Generally speaking, taro, European cyclamen and the like have corm. Dahlia and sweet potato have tubers, whereas lily, narcissus and the like have bulbs. Kimjongilia has a tuber which is the thickening of the stem like in yam and potato. Unlike potato which has several tubers, Kimjongilia has one tuber which is the thickening of the stem on the neck of the root.

Even in case of propagation by tuber, there are the plants like gladiolus which propagate by multiplying tubers and the

Narcissus



Lilium lancifolium

European cyclamen



plants which do not multiply them.

Kimjongilia does not multiply the tuber. Every year its tuber grows and bears new eyes. It is propagated by planting eye cuttings. The tuber of Kimjongilia has a long life. The tuber of gladiolus degenerates and loses the characteristics of the species in 3-4 years, whereas the tuber of Kimjongilia continues to grow and retains its characteristics for more than 15 years and sometimes up to 30 years.

Preparation of the Tuber and Keeping It in Dormant Condition:

After flowers fall the plant enters a rest period. At this time the tuber becomes large storing nutrients there and apical eye and lateral eyes are formed. In this period one should not neglect the tending of the plants, putting them beneath the flowerpot stand on the assumption that the flowers have already fallen. Even after the flowers have fallen the plant should be tended, having it exposed to weak light (about 5,000 luxes) for 8-10 hours in the daytime and maintaining temperature at 7-10°C at night, the lowest temperature being 18-20°C and watering it so that the flowerpot does not dry. It is desirable not to apply fertilizer in this period. Generally speaking, the tuber is formed in 40-50 days. When leaves turn yellow and fall, the stem is cut leaving about 10 centimetres of it. Then an absciss layer is formed between the tuber and the stem and the stem abscises.

Generally speaking, the tubers grown in the first year of culture measure 6-8 centimetres across and weigh 80-100 grams although they vary according to the state of the plant and the conditions of culture. At this time three or four eyes are formed.

The culture soil is removed and the tubers are dug up when the culture soil dries up in about one week after the stem has fallen off the tuber. According to the conditions of the hothouse the tubers may not be dug up and preserved in flowerpots.

Hairy roots are removed from the dug-up tubers and the thick roots are left as long as one centimetre. If the thick root is cut out unreasonably, it may be spoiled when storing. It is desirable to secure high temperature and moisture by preserving the dug-up tubers at the temperature of 20-30°C after covering them with paper and watering them a little rather than keeping them as they are. At the same time the tubers are to be turned over two or three times a day.

If the tubers are treated in this way, a corky tissue layer is formed on the tubers and spoilage during storage will be prevented.

As for other tuberous flowering plants, large tubers generally give better flowers. As for Kimjongilia, the tubers which are one or two centimetres across, give rise to large flowers too. Therefore, the small tubers formed in the young plant and the small tubers formed in the branch cuttings planted, too, are

fully capable of giving good flowers in the next year.

The dug-up tubers are kept buried in sphagnum moss or sand or covered with paper several times for about two months at the temperature of 1- 4°C. In this period the content of abscisic acid and other growth-suppressing agents in the eyes of the tubers decreases, enabling them to come out of dormancy. Storage of tubers at low temperature for 5-6 months does not greatly interfere with further growth.

Temporary Planting of Tubers:

In order to propagate by tubers they are planted temporarily four or five months earlier than the flowering period. The tubers in storage are dug up and disinfected by immersing them in 0.05 % solution of potassium permanganate or dipped in water for about two or three hours before they are planted in the box of about 60 x 40 x 10 centimetres. Fragments of broken flower-

pot or sand are placed at the bottom of the box and then above it peat or leaf mold is spread in the layer of 3-4 centimetres. Then tubers are planted at the intervals of 5-10 centimetres. Then they are covered with leaf mold to such an extent that they are buried in it. The box is watered sufficiently before it is covered with packing paper lest moisture evaporates. Water is sprayed with a water sprayer when the leaf mold dries. The eyes begin to germinate in 5-7 days at the mean temperature of 18-20°C and in relative humidity of 70-80 %. Then the paper is removed. New sprouts grow three or four centimetres in 6-7 days after the sprouts have appeared when the intensity of light is gradually increased and they are placed under normal care.

Transplanting of Tuber Seedlings: Three or four leaves come out and the root grows two or three centimetres in about one

**The flowers which began to come into bloom
in four months after planting the tubers**



month after temporary planting of tubers when the plants are transplanted in flowerpots.

Tuber seedlings are transplanted as a whole or divided into 2-4 pieces including eyes. When tuber cuttings are planted, the cut surface is spread with sulphur powder to prevent spoilage. Tuber seedlings are generally planted in the flowerpots which are 13-16 centimetres across. When the root grows well and the tuber is large, it is sometimes transplanted in the flowerpot which is 19-20 centimetres across.

The culture soil is filled to a moderate depth according to the size of tuber and the central part is made somewhat convex and the tuber is placed on it. The roots are evenly spread and the culture soil is again filled to such depth that the tuber is somewhat buried.

It is desirable to fill the culture soil till it comes up to about one centimetre beneath the rim of the flowerpot. The tubers are watered sufficiently one or two hours after their planting. The flowerpots planted with tubers are kept in shade for several days before they are gradually moved to the place under moderate sunlight. Fertilizer is applied about ten days after transplanting.

Props are set when the tuber seedling grows and begins to put forth flower buds. Care must be taken not to harm the tuber.

Secret of Tissue Culture

The great leader Comrade Kim Il Sung said:

“Long-term research should be conducted with a view to opening up new scientific fields and introducing the latest developments in science and technology widely in the national economy.”

A new fast-developing field of gardening is the technique of mass propagation by tissue culture. This technique developed with the progress in the research work, started in Juche 49(1960), to obtain a plant free of virus from the growing point of the plants belonging to the orchid family. Over ten years later the technique began to be widely followed to massproduce orchid, China pink, Transvaal daisy and other garden flowers.

At present an “orchid industry”, propagating several ten species of the orchid family by this method, has been created and is run as an enterprise in different countries and the same technique is used to produce not only flowering plants but also tree seedlings.

Recently production of seedlings by tissue culture has been automated.

What then is the tissue culture of plants and what is its secret?

The tissue culture of a plant means the technique by which the definite tissue or organ of a plant is removed and a new tissue or plant is reproduced by cultivating the removed tissue or organ in a germ-free condition in the test tube.

The technique is based on the potentiality of the plant cell. Briefly speaking, the potentiality of the plant cell means the ability of a plant cell to produce a whole plant. In each plant cell the heredity information to be developed on to a whole plant is preserved in the chromosome in the form of DNA. A whole plant is produced with the heredity information realized at the different stages of the growth of the plant. Therefore, any tissue or organ taken from a plant can be reproduced as a whole plant when the heredity information kept in them is realized. The secret of tissue culture precisely lies in the DNA.

When plants are propagated by the method of tissue culture, healthy seedlings can be obtained several hundred or several thousand times quicker than the usual method of vegetative reproduction. Therefore, this method is widely used to reproduce the plants of good strain on a mass scale.

Like in the tissue culture of other plants, reproduction of *Kimjongilia* by tissue culture undergoes the following four stages of culture.

Primary Culture: Primary culture means the culture of the first generation. In other words, it is the first process of culture in which a definite tissue or organ is removed from a plant and cultivated in a germ-free condition to obtain a new sprout.

The plant tissue which is taken away and planted for primary culture is called tissue for culture.

Leaves are mainly used as the tissue for culture in the tissue culture of *Kimjongilia*. In addition,

the growing point, stem and flower stalk can be used as the tissue for culture.

The tissue for culture should be taken from the plant which



Tissue culture room

preserves the qualities of the prototype and is in good vegetative condition. The tissue for culture can be taken in any season except summer. It is desirable not to take the tissue for culture in summer because it may be affected by various diseases and blights. But the tissue for culture can be taken even in summer in the automated hothouse where seedlings are tended with agricultural chemicals applied regularly. In case of use of leaves as the tissue for culture the material can be chosen according to the permeability of alcohol into the leaf tissue. When the leaves affected by diseases and blights are immersed in a 70% alcohol solution, it penetrates the cut surface 4-5 centimetres deep and the colour of the leaves changes. The removed leaves are well washed in running tap water and immersed in a 70% ethyl alcohol solution for 2-3 seconds and then

in the upper layer of a 2% solution of chloride of lime for 30-40 minutes for disinfection. For culture of plants they are generally dipped in a 7% solution of chloride of lime for 15-20 minutes for disinfection. In case of use of leaves as the tissue for culture they are well disinfected when the concentration of chloride of lime is decreased and the disinfection is prolonged.

If they are much affected in the process of disinfection, it means that germs have penetrated deep into the leaf tissue. In that case other material must be chosen. Old bleaching powder free of active chlorine must not be used. After disinfection the tissue for culture is placed in a beaker filled with sterilized water to wash away the residue of chloride of lime 3-4 times. Leaves then are placed on the sterilized filter and cut to be about 7x7 millimetres and put on the culture medium in the test tube in such a way that its front surface contacts the culture medium. When petiole or flower stalk is used as the tissue for culture, they are disinfected in the above mentioned manner and cut to be 7-10 millimeters. When thick materials are used, they are cut into 2-4 pieces lengthwise and the cut surface is contacted with the culture medium.

When the growing point is used as the tissue for culture, it is cut to be 0.1-0.2 millimeters under stereomicroscope and is contacted with the culture medium.

The test tubes with the tissue for culture contacted with culture

medium are placed on the culture stand. In the culture room temperature is maintained at 23-25°C in the daytime and at 18-20°C at night and it is exposed to the light of 1,500-2,000 luxes for 12 hours. In normal cultivation the outer epidermal layer swells, split into 3-4 layers in 7-10 days and the signs of sprout appear in the lesioned part of tissues, leaf vein and outer epidermal layer on the cut surface in 20-30 days and sprouts grow to be 0.5-2 millimeters in 30-40 days.

Therefore, primary culture is considered to last 30-40 days. But it sometimes lasts 40-50 days according to the materials.

Multiplying Culture: Multiplying culture means the process of culture in which the buds obtained in primary culture are multiplied. In the process of multiplying culture buds-leaves are multiplied to be several ten or several hundred pieces. For multiplying culture the tissues with differentiated buds are removed from the test tubes to a spatula and are cut by sharp knife to be as large as a rice grain.

Then the culture medium for multiplication of sprout and the culture medium for growth of sprouts are brought into the sterilized room together. The sprouts measuring less than two millimeters are placed on the culture medium for multiplication of sprout and the sprouts larger than two millimeters with some additional tissues attached beneath them are placed on the culture medium for growth of sprout.

Solid or liquid culture medium may be used as the culture medium for multiplication of sprout. In case of use of solid culture medium it is replaced every 25-35 days. In case a liquid culture medium is used it is desirable to replace it every 7-15 days. At the stage of multiplication the solid culture medium and the liquid culture medium is laid five millimeters thick. This ensures respiration of the leaf tissue of the sprout.

It is good to replace culture medium about ten times. When culture medium is replaced more than ten times, deformed leaves may appear.

Temperature and intensity of light are kept to be the same as in primary culture. It is desirable to prolong the time of exposure to light to 16 hours.

Culture for the Growth of Sprout:

Culture for the growth of sprout is the process of culture by which the whole plants are reproduced by transplanting the bud-leaves obtained in the stage of multiplication in the culture medium for the growth of sprouts. It is called the process of culture for differentiation of roots because in this process of culture

the plants strike root.

At this stage, the bud-leaves which are obtained in the process of multiplication and have the petiole longer than two millimetres and the leaves as large as five millimeters are used as materials for culture. In the process of replacement these bud-leaves are chosen and transplanted in the culture medium for growth. It is desirable to plant them in the intervals of about 1-1.5 centimeters. The temperature for culture is kept to be the same as in the case of primary cultivation and they are exposed to the light of 2,500-3,000 luxes for 12 hours a day. When they are grown in these conditions for 50-60 days, the leaves grow 1-1.5 centimetres, the petiole, to two centimetres and the roots, several millimetres. The plants in the living state weigh about 300-500 milligrams. Then the plants are dug up and put to acclimatization.

Acclimatization: Acclimatization, the last process of tissue culture, is the hardening process in which the young plants, grown in the culture medium of the culture bottle, are acclimatized to the open climatic conditions for a definite period.

The young plants taken out of the culture bottle have their stomas open because they were in the saturated humidity. Therefore, the stomas fail to perform their function of opening and closing properly and when the young plants are placed abruptly in the open with low humidity they may wither because the balance between absorption

Budding culture



of moisture and evaporation is lost. Therefore, they must be acclimatized to the climate, gradually decreasing humidity. The roots which grew in the culture bottle fail to function properly in the culture medium in the open air. Only when they strike root anew, adapted to the new culture medium, do they properly absorb moisture and nutrients. They acquire this function through acclimatization.

Sand, pumice, sphagnum, peat and others are used as the culture medium for acclimatization.

Sand is more commonly used. It is desirable to use coarse sand.

Sand is washed with water several times to remove impurities. Coarse sand is spread in the acclimatization box and then above it the fine sand as deep as five millimeters. When culture medium is prepared, the seedlings are taken out of the culture bottle with a pincette with long legs and the residue of culture medium is washed away well in tap water. Then the lesioned tissue adhering to the neck of the roots are carefully removed with the tip of knife.

Then the seedlings are spread on the packing paper so that moisture is absorbed and then planted in the seedling box.

It is desirable to plant them in the intervals of 1.5-2.5 centimetres. They are planted as shallow as they do not

tumble over, buried in the culture medium up to the neck of the roots. Care must be taken so that the growing point does not be buried in the culture medium.

After planting, water is sprayed on the seedlings with a water sprayer so that pores between the roots of the seedlings and sand can be filled.

Then the seedling boxes are covered with glass or plastic plate to ensure saturated humidity as in the culture bottle. The water drops formed on the inner side of glass or plastic plate must be wiped out lest they drop on the seedlings. Humidity must be gradually decreased through ventilation by placing pebbles between glass or plastic cover and the box. The seedlings are tended for about 10-15 days while controlling humidity in this way before the cover is entirely removed.

During acclimatization it is desirable to keep temperature at 20-22°C in the daytime and at 18-20°C at night, the intensity of light at 3,000-4,000 luxes and the time of exposure to light to be more than 14 hours.

Acclimatization in the seedling box lasts 30-35 days. In this period new roots grow to be 1-2 centimetres, new bud-leaves come forth and leaves grow. The seedlings acclimatized in this way are transplanted in the flowerpots which are 7-10 centimetres across.

BEAUTIFUL KIMJONGILIA

Words by Kim ThaeK Yong

Music by Om Ha Jin

(♩ = 92)

so damhan kkotsong-i gibbumul angyoju go

yu jonghan guhyang-gi gasume hul lodu- ne

(Refrain)

thaeYanghwaro noraeha-nun arumdaun kim jongil hwa

ja- juui sae segye e bulgunnoulpyol chyoga- ne

1. The lovely flowers give pleasure,
The sweet aroma fills people's breast.
(Refrain)
The beautiful Kimjongilia sung as the
sun flower.
Brings glow over the new world of
independence.

2. It is in full bloom across the country
as the Korean flower.
It dyes the whole world as the flower
for all.
(Refrain)



Kimjongilia

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